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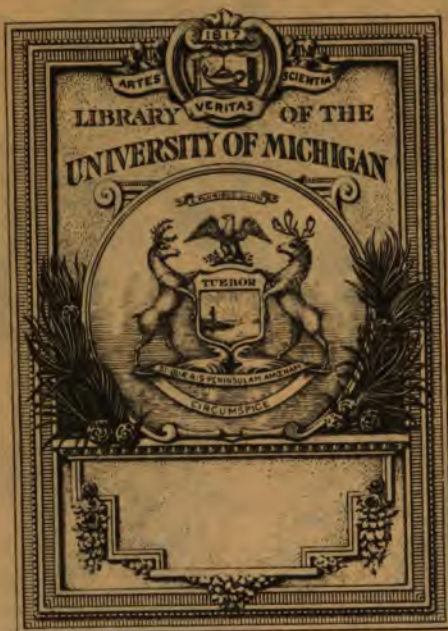
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4 Parts pub 1827-31. Covers at
commencement

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~~1827-31~~ 125

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THE
ENIGMATICAL ENTERTAINER

AND
MATHEMATICAL ASSOCIATE,

FOR
THE YEAR 1828.

No. I.

CONTAINING
NEW ENIGMAS, CHARADES, REBUSES, ANAGRAMS,
PHILOSOPHICAL AND MATHEMATICAL
QUESTIONS;

PROPOSED TO BE ANSWERED NEXT YEAR.

London :

PRINTED FOR THE EDITORS,
AND PUBLISHED BY DAVIS AND DICKSON, 17, ST.
MARTIN'S-LE-GRAND.

Sold by SHERWOOD and Co., and W. BAYNES, Paternoster Row ;
DEIGHTON and SONS, Cambridge ; PARKER, Oxford ;
BLACKWOOD, Edinburgh ; ARCHER, Dublin ; and
all other Booksellers in the United Kingdom.,

1827.

(Price One Shilling.)

GUNNELL AND SHEARMAN,
PRINTERS,
SALISBURY SQUARE.

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THE

EDITORS' ADDRESS.

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NOTWITHSTANDING we have already caused to be circulated a Prospectus of the Work of which this is the first Number, it may not be improper to give again a few particulars of the plan on which we intend to conduct it, for the information of those individuals who may not have seen a copy of that prospectus; and also to accompany this our first Number with a few remarks, which may be necessary for the guide and satisfaction of our contributors; and it is no small gratification to us to be able to tender our thanks to so many of them for the assistance so readily afforded us for our first Number, which we are willing to believe is intended as an earnest of what they purpose doing for the promotion of the Work. It was suggested by us in our prospectus which was circulated, stitched to the last Number of the *Mathematical Companion* (now discontinued), that "*The Enigmatical Entertainer and Mathematical Associate*," was intended to supply the place of that Work; but, that it was our intention to conduct it in a manner somewhat different to that of its predecessor; and we hope by the liberality of our plan, by an impartial and judicious selection from the contributions furnished us, to be

able to send out to our contributors and the public, a Work worthy of their support.

We are by no means actuated by any spirit of opposition, but our wish is, merely to contribute to Enigmatical and Mathematical amusement, after the manner of those two excellent little works, "The Ladies' and Gentlemen's Diaries," which have been so long and deservedly supported; but the prescribed limits of which must necessarily oblige them to omit inserting much that is valuable. It is in a great measure with this in view that we have undertaken the present task of furnishing a Work of the same kind, but capable of containing much more matter, in order to afford a wider field for the exercise of the abilities of the enigmatist and mathematician.

One of our contributors (and one whose assistance we highly value) says in a letter to us that a work such as we purpose ours to be, would be a desideratum to the little world of Enigmatology; and that he would fain persuade himself that talents equal to those which shone with such brilliancy in the Ladies' Diary in the days of the *Centuriums*, the *Bentleys*, the *Tassos*, the *Woolstons*, and a host of others, are yet to be found, and would step forward to the support of a work providing so liberally for their amusement, and where their productions could appear in conjunction with those of other individuals of talent. We also are of opinion that many such are to be found, seeing the encouragement we have received for our first Number. Nor shall we by any means be less anxious to promote the mathematical department, by a careful attention to what may be furnished to us; and duly considering that our object is also the advancement of mathematical knowledge, we shall impartially select for publication whatever may be deemed most likely to facilitate the progress of those sciences; and in so doing, we shall not disregard the hints of some of our mathematical contributors, "not to indulge a too rigid and unbending attachment to the geometry of the

Greeks, to the exclusion of those branches of the mathematics which are now very generally pursued," but while we endeavour to keep alive a taste for the remains of Pythagoras and Plato, we hope also to direct our readers into the wider fields of enquiry which the modern analysis has disclosed: in short, we shall not attach our Work exclusively to any particular branch, but endeavour to make it a useful receptacle for mathematical enquiry generally.

As to the general contents of our Work, we purport inserting in each Number, 20 Mathematical Questions; and should its limits admit, it is our wish to insert occasionally any valuable and original Mathematical paper with which we may be favoured—if not so long as to prevent the appearance of the regular matter, the property of each respective department.

We shall be glad to receive many queries and philosophical questions, and seeing the utility of such enquiries, we shall willingly insert 10 or more of them.

For the poetical department, we shall select 20 Enigmas—and 30 Charades, Rebuses and Anagrams.

And also in the ensuing Numbers, we shall insert as great a variety of the best Answers furnished us for the different departments—Poetical, Philosophical and Mathematical, as the limits of the Work will allow.

It is our intention in the arrangement of the poetical contributions we may receive, to insert them in the order of an alphabetical list of the names of their authors; (except the Prize Enigma); hence, we shall avoid the imputation of partiality which might be adjudged to us by our attempting to arrange them according to their merits.

We would also mention that as it would be a great inconvenience to the Editor of the Mathematical part, to insert Questions sent him without their Solutions, it is requested that Solutions be sent with all Questions, or

they will not be inserted : it is also hoped that those persons who contribute to both the Poetical and Mathematical parts, will so write their contributions as to admit of their being separated—and it would be very desirable that they should draw their Diagrams of the proper size.

As several of our contributors have alluded in their letters to contributions which they had sent for the use of the Mathematical Companion, permitting us to insert them in our Work—we beg leave to inform them that we had no interest in that work ; and having applied to the late publisher of it, he informed us, that when the work was discontinued, the papers contributed for its use were no longer preserved ;—but if those parties will favour us with copies of such Enigmas, &c. &c., we shall have pleasure in selecting from them for our use.

We shall allot annually to our contributors 9 prizes ;—viz., for answering ten questions (not including the prize question) a chance for four Enigmatical Entertainers ; for twelve, (including the prize) a chance for six—for all the questions a chance for eight—for answering the Prize Enigma two chances for four Entertainers—for general answer to the Enigmas, two chances for six—to the Charades, &c., a chance for six—and to all the queries, a chance for four.

All letters must be addressed (free of postage) for the Editors, care of Davis and Dickson, Scientific Booksellers, &c., 17, St. Martins-le-Grand, London,—by whom the work will be published for the Editors : and as No. II. will be published on the 1st October, 1828, instead of the 1st November, as was first intended, all letters containing matter for insertion must come to hand before the 1st of May next.

London, 28th October, 1827.

THE
Enigmatical Entertainer,

AND
Mathematical Associate,

FOR
THE YEAR 1829.

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No. II.  
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Containing
ANSWERS TO THE LAST YEAR'S
*Enigmas, Charades, Rebuses, Anagrams, Philosophical
and Mathematical Questions ;*

AND ALSO,
NEW ENIGMAS, CHARADES, REBUSES, ANAGRAMS,
PHILOSOPHICAL AND MATHEMATICAL
QUESTIONS,

PROPOSED TO BE ANSWERED NEXT YEAR.

London :

PRINTED FOR THE EDITORS,
AND PUBLISHED BY DAVIS AND DICKSON, 17, ST. MAR-
TIN'S-LE-GRAND ;

Sold by Simpkin & Marshall, Stationer's Hall Court; Sherwood & Co.,
Paternoster Row; Deighton & Sons, Cambridge; Parker, Oxford;
Blackwood, Edinburgh; Archer, Dublin; and all other
Booksellers in the United Kingdom.

1828.

[Price Three Shillings.]

Compton and Ritchie, Printers, Middle Street, Cloth Fair, London.

ADDRESS.

THE Proprietors are unwilling to send forth the second Number of the "*Enigmatical Entertainer and Mathematical Associate*," without returning thanks to their numerous Contributors for the favors with which they have obliged them, and hoping that the impartial selection which has been made from the various contributions will be satisfactory to all parties; but as the prescribed limits of their Work would not permit their inserting all they could have wished of what was furnished them, they may select, at some future time, from what has now been unavoidably omitted.

They would, at the same time, respectfully mention to their Mathematical Contributors, that a little care is necessary in transcribing their solutions, &c. &c., as in several instances the Editor has had either to make fair copies of many of them for the printers, or submit to their being cancelled when at the press; which will, in one or two instances, account for fewer answers by the same individual having been inserted, than was at first intended by the Editor.

The Proprietors would also beg leave to repeat, that as it would be a great inconvenience to the Editor to insert questions sent him *without* their solutions, it is requested that their solutions may accompany all questions, or they will not be inserted: likewise that those persons who contribute to both the poetical and mathematical parts, will so write such contributions as to admit of their being separated; and it is hoped that they will draw their diagrams of the proper size, viz. the usual size of those in the work.

As in the arrangement of the Poetical Contributions we have been guided by an alphabetical list of the Names of the Contributors, except as regards the Prize Enigma; so also, it will be perceived, has been the case in our arrangement of the New Mathematical Questions, which can make no difference to persons answering, seeing they always select those Questions with which they are best pleased.

The Prizes have been determined, by lot, as follows: For answering all the Questions, to Mr. WM. RUTHERFORD, 8 Entertainers; for Twelve, including the Prize Question, to Mr. GRIFFITH JONES, 6 Entertainers; for Ten, not including the Prize, to Mr. HENRY CLAY, 4 Entertainers; for the Prize Enigma, to A. E. and WINIFRED WAVERTON, 4 Entertainers *each*; for the Enigmas, to Mr. JOHN HOPE, and C. N., 6 Entertainers *each*; for the Charades, &c. to Mr. NOAH WILMOT, 6 Entertainers; and for the Queries, to Mr. JOHN BAINES, 4 Entertainers. Who are requested to send for their respective Prizes to the Editors, care of *Davis & Dickson*.

All letters must be addressed (free of Postage) for the Editors, care of *Davis & Dickson, Scientific Booksellers, &c. 17, St. Martin's-le-Grand, London*; and all Contributions intended for insertion in No. 3 must, without fail, come to hand before the 1st of May next.

Number III will be published on the 1st of October, 1829.

LONDON,
Sept. 27, 1828.

THE
Enigmatical Entertainer

AND
Mathematical Associate
FOR
THE YEAR 1830;

Containing
ANSWERS TO THE LAST YEAR'S
*Enigmas, Charades, Rebuses, Anagrams, Philosophical
and Mathematical Questions ;*

AND ALSO,
NEW ENIGMAS, CHARADES, REBUSES, ANAGRAMS,
PHILOSOPHICAL AND MATHEMATICAL
QUESTIONS,

PROPOSED TO BE ANSWERED NEXT YEAR.

No. III.

London :

PUBLISHED BY SHERWOOD AND CO., PATER-
NOSTER ROW ;

And Sold by Davis & Dickson, St. Martin's-le Grand ; Simpkin & Marshall,
Stationers' Hall Court ; Deighton & Sons, Cambridge ; Parker,
Oxford ; Blackwood, Edinburgh ; Archer, Dublin ; and
all other Booksellers in the United Kingdom.

1829.

[*Price Three Shillings.*]

Compton & Ritchie, Printers, Middle Street, Cloth Fair.

ADDRESS.

THE Editor hopes that the selection which he has made from the various contributions which were furnished him for this *third Number* will give satisfaction to all parties; yet he much regrets that the limits of the Work obliged him to omit the insertion of several contributions of merit, particularly the Mathematical Papers by Mr. Cunliffe and Mr. Rutherford; but it will be remembered, that the Prospectus stated that such Papers would be inserted at such times as the insertion of them would not tend to the exclusion of the regular matter.

The introduction of so many Answers to the Enigmas, &c. proposed last year, compelled the Editor, with some reluctance, to omit several Rebuses, Anagrams, and Queries, intended for publication.

The Prizes have been determined by lot as follows: The first Mathematical Prize to Mr. CHARLES GILL, 8 Entertainers; the second to Mr. N. J. ANDREW, 6 Entertainers; the third to Mr. RICHARD ABBATT, 4 Entertainers: for the Prize Enigma, to Mr. JOHN HERDSON and Mr. PERCI KING, 4 Entertainers each; for the

Enigmas, to Mr. T. R. SMART and Mr. THOS. WHICKER, 6 Entertainers *each*; for the Charades, &c. to Mr. CHAS. HOLT, 6 Entertainers; and for the Queries, to Mr. DAVID ROBARTS, 4 Entertainers; who are requested to send for their respective *Prizes* (in their usual writing) to the Editor, care of *Davis & Dickson, Booksellers, &c. St. Martin's-le-Grand, London.*

All letters must be addressed (free of postage) to the Editor, care of *Davis & Dickson* (as formerly); and all contributions intended for insertion in No. IV must reach the Editor by the 1st of May next.

Number IV will be published on the 1st of October, 1830, by SHERWOOD & Co. *Booksellers, Paternoster Row, London.*

As there are but a few copies of Nos. 1 and 2 on hand, an early application is recommended to those parties who wish to have their sets complete.

LONDON,
Sept. 29th, 1829.

THE
Enigmatical Entertainer

AND
Mathematical Associate

FOR
THE YEAR 1831;

CONTAINING
ANSWERS TO THE LAST YEAR'S
ENIGMAS, CHARADES, REBUSES, ANAGRAMS, PHILOSOPHICAL
AND MATHEMATICAL QUESTIONS;

AND ALSO,
A COMPLETE GENERAL INDEX.

No. IV.

London :

*Published by Sherwood & Co., Paternoster Row; and
Davis & Dickson, St. Martin's-le-Grand;*

And Sold by Simpkin & Marshall, Stationers' Hall Court; Deighton & Sons,
Cambridge; Parker, Oxford; Blackwood, Edinburgh; Archer, Dublin;
and all other Booksellers in the United Kingdom.

1830.

[*Price Two Shillings and Three Pence.*]

Compton & Ritchie, Printers, Middle Street, London.

ADDRESS.

THE Proprietors return their best acknowledgments to the various Contributors for the assistance they have from time to time received from them; and also inform them, that, as it is inconvenient for them to carry on the Work, this Number will be the last; but in order that it might not be discontinued incomplete, they have furnished an Index to all the Numbers published.

The Prizes have been determined as follows: The first and second Mathematical Prizes, no claimants; the third to Mr. WILLIAM MITCHELL, 4 Entertainers; for the Prize Enigma, to Messrs. J. POWELL and F. YARROW, 4 Entertainers *each*; for the Enigmas, to Messrs. H. SMITH and W. WILLIAMS, 6 Entertainers *each*; for the Charades, &c. to Mr. J. BEAN, 6 Entertainers; and for the Queries, to Mr. JAMES MASON, 4 Entertainers; all of whom are requested to send for their respective Prizes (in their usual writing) to the Editor, care of *Davis & Dickson, Booksellers, &c. St. Martin's-le-Grand, London.*

Persqns wishing to complete their sets, are recommended to make an early application, as but few copies of the preceding Numbers are left.

A few complete sets may be had if applied for shortly.

LONDON,
October 29, 1830.

MATHEMATICAL QUESTIONS.

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—◆—

Question (1), by Mr. James Jerwood.

It is required to find the number by which a people must increase annually, so that they may be doubled at the end of every century.

N.B. This is the 32d miscellaneous question in Donnycastle's Algebra, but as it admits of a more simple solution than Mr. B. has given to it in his key, it is here proposed.

Question (2), by the same.

If a body revolve in an elliptical orbit, it is required to determine a point where its angular velocity is an harmonic mean between its greatest and least velocities.

Question (3), by D. T. Sheridan.

A B C is a semicircle, A B the diameter, O the centre, and A C any chord; join C O, along which take C D always $= \frac{A C^2}{A B^2}$; find the equation and area of the curve, which is the locus of D.

Question (4), by Mr. Thomas Todd, Liverpool.

Given the least side (26), and the sum of three straight lines (48.41375) drawn from each of the angles of a plane triangle, to a point within it, so as to make the three angles, formed thereby, equal to one another; to construct geometrically the triangle.

Question (5), by Mr. John Cam, Torpenhouse.

Given the time down the hypotenuse to construct the right angled triangle geometrically, when the difference of the hypotenuse and perpendicular is given or a maximum.

Question (6), by Mr. Richard Abbott, Eagle House, Brook-Green.

Let θ be any circular arc, then $\cos. \frac{1}{2} \theta = \frac{\sin^2. \theta \operatorname{cosec}. \theta}{2 \operatorname{cosec}. \theta - 2 \cot. \theta}$:

required the proof.

Question (7), by Mr. Isaac Newton, Wisbeach.

In ACB the vertical section of, or cap or crown of a windmill whose summit is C, the curves AC, CB are each composed of two circular arcs of 60° each; being partly concave and partly convex towards AB, the diameter of the cap's base. Required the expense

NEW QUESTIONS.

of painting the cap, supposing $AB = n$ yards, and that 1s. 6d. be given for 1 square yard.

Question (8), by Mr. Thomas Todd.

Suppose each of the sides of a plane triangle to be bisected by straight lines drawn from the opposite angles; now, there is given each of the three differences between each bisecting line and the side which it bisects, to construct the triangle.

Question (9), by Mr. Richard Abbott.

Through a given point in the common chord of two given intersecting circles, to draw a straight line, so that the segments intercepted by the circles shall have a given ratio.

Question (10), by Mr. John Collins, 43, Hatton Garden.

A certain sum was spent at a public dinner, which was paid with sovereigns, seven shilling pieces, shillings and sixpences: now it was observed that the product of the number of pieces was the greatest possible, and that the whole sum spent was the least the condition of the question would admit of: required the number of each sort, and the sum spent.

Question (11), by Mr. William Jacobs.

It is required to find the equation of the projection of the intersection of two unequal right cylinders, their axes being at right angles to each other and the projection to be made on a plane passing through the axes.

Question (12), by Mr. Thomas Collins, Academy, 18, Kirby Street, Hatton Garden.

Two angles of 45° , BAC, BDC, being given in position, and making them turn on their fixed vertices A, D, in such a manner that the two sides AB, BD, may always intersect each other in a line parallel to the lines joining the vertices AD, it is required to find the nature of the curve described by the intersection C of the other two sides AC, DC.

Question (13), by Mr. Robert Maffett, Richmond Street, Plymouth.

Transform the following formulæ into Squares, viz. $n^2 + n + 1$, $m^2 + m + 1$, and $n^2 + nm + m^2$.

Question (14), by Mr. Griffith Jones, Liverpool.

Let ABC be an angular pendulum composed of two cylindrical wires, AC and BC of unequal lengths vibrating on the point of suspension (C), in the plane of the figure—required the respective distances of the centres of gravity, oscillation, and gyration, from the point of suspension.

NEW QUESTIONS.

Question (15), by Mr. Henry Clay.

Upon CD, any right sine of given circle, describe an equilateral triangle, and determine the quadrature of the curve in which its vertex will be found.

Question (16), by M. M.

If U be the radius vector, ρ the radius curvature, at an *apex* and θ the angle which the radius vector makes with a given line

$$\frac{1}{\rho} = u + \frac{d^2 u}{d \theta^2}$$

Question (17), by Mr. Robert Maffett.

If a Globe of Ash 10 feet diameter be depressed in water till it is level with the surface, and then be suffered to ascend, it is required to determine the time of its ascent.

Question (18), by Mr. Griffith Jones.

Given the centripetal force as the square of the distance inversely to find the resistance (to a body moving in medium) so that the body may describe a circle about the centre of force, that centre not coinciding with the centre of the circle.

Question (19), by Mr. Henry Clay.

EF is an indefinite right line perpendicular to the given right line AB:—From A to any point I, in EIF, draw AI, perpendicular to which erect IP=AB: then will the locus of P be a curve line whose properties and quadrature are required.

PRIZE QUESTION (20), by N. N.

Out of a reservoir irregularly supplied with water, a constant supply is wanted for certain purposes, and it has been found that a rectangular perforation, the breadth of which is b and depth d inches will yield the quantity wanted when the reservoir is full; but this being seldom the case, another aperture, having its base in the same right line with the upper side of the former one is wanted, which is to be entirely closed by a shuttle when the reservoir is full.

Now suppose the shuttle to be connected to one end of a lever (the arms of which are a and c inches in length), to the other end of which a buoy is fixed which floats in the reservoir, raising or depressing the shuttle as the water in the reservoir falls or rises; what must be the equation of the curve of the upper aperture, so that the same quantity of water may be constantly discharged.

N. B. This Question was inserted in a periodical, about 25 years ago, but was not publicly answered, as the number which contained it was the last of the work, and seeing its principles are somewhat original, and being also solicited, we have been induced to insert it here.

E.

THE Public are hereby informed, that but very few copies of the "Gentleman's Mathematical Companion," (now discontinued,) remain unsold, and not any of the Numbers of the work will be re-printed. A set, consisting of 30 Nos., making 5 vols., may be had for £3 3s.; or, any odd Numbers at the prices at which they were originally published; as follow:—

		s.	d.	
1798 to 1800 both inclusive	..	1	0	.. each No.
1801 to 1808 ditto	..	1	6	.. ditto
1809 to 1810 ditto	..	2	0	.. ditto
1811 to 1820 ditto	..	2	6	.. ditto
1821 to 1824 ditto	..	3	0	.. ditto
1825 to 1826 ditto	..	4	0	.. ditto
1827	..	3	0	.. ditto

THE MATHEMATICAL ASSOCIATE.

ANSWERS TO THE QUESTIONS

PROPOSED LAST YEAR.

I.—QUESTION (1), by Mr. JAMES JERWOOD.—It is required to find the number by which a people must increase annually, so that they may be doubled at the end of every century.

Answered by Mr. W. RUTHERFORD, Mathematical Master, Academy, Hawick, Roxburghshire.

In order to render the solution as simple as possible, let the people be represented by unity; then, if the first year's increase be denoted by $\frac{1}{n}$, the second year's increase will be $\frac{1}{n} + \frac{1}{n^2}$;

hence $1 + \frac{1}{n}$ will be the number of people at the end of the first

year, and $\left(1 + \frac{1}{n}\right)^2$ the number at the end of the second year.

In like manner the number at the end of the third year will be

$\left(1 + \frac{1}{n}\right)^3$, and at the end of a century $\left(1 + \frac{1}{n}\right)^{100}$, which, that

the people may be doubled, must be $= 2$; therefore, $n = 1 \div$

$\left(\sqrt[100]{2} - 1\right) = 1 \div 00695 = 144$, nearly; therefore the people must increase annually by the 144th part, very nearly.

Again, by Mr. W. GODWARD, Teacher of Mathematics, Wakefield; and Mr. D. T. SHERIDAN, of Colton Hall, Staffordshire.

Let the p th part of the population with which each year commences denote its annual increase; then, by formula vi, page 222,

Bridge's Algebra, we have $\log. \left(1 + \frac{1}{p}\right) = \frac{\log. 2}{100} = .0030103 = \log. 1 \frac{1}{144}$, very nearly. Whence $1 + \frac{1}{p} = 1 \frac{1}{144}$; and consequently $\frac{1}{p} = \frac{1}{144}$, the answer.

Similar to the above were the answers sent by Messrs. Middlemiss and Dawson.

II.—Question (3), by Mr. JAMES JERWOOD.—If a body revolve in an elliptical orbit, it is required to determine a point where its angular velocity is an harmonic mean between its greatest and least velocities.

Answered by the PROPOSER, and Mr. W. HARDCASTLE, jun., Chester-le-Street, near Durham.

Let D and d be the greatest and least distances, and let x represent the required distance; then, because in different points of the same curve the angular velocity varies inversely as the square of the distance (see *Carr's Newton*, p. 150), we have, by the nature

of the problem, $\frac{2\left(\frac{1}{D^2} \times \frac{1}{d^2}\right)}{\frac{1}{D^2} + \frac{1}{d^2}} = \frac{2}{D^2 d^2} \div \frac{D^2 + d^2}{D^2 d^2} = \frac{2}{D^2 + d^2} = \frac{1}{x^2}$;

hence $x^2 = \frac{D^2 + d^2}{2}$, and $x = \sqrt{\frac{D^2 + d^2}{2}}$ = the distance of the point from the centre of force.

Again, by Mr. S. KNIVETON, of Wirksworth, Derbyshire; and Mr. W. OAKES, of Harlow, Staffordshire.

Let a and p be the greatest and least distances from the centre of force, and x = radius vector to the required point. Then, since the velocities are reciprocally as the square of the distance, we shall have, by the property of harmonic proportion, $\frac{1}{a^2} - \frac{1}{x^2}$

$:\frac{1}{x^2} - \frac{1}{p^2} :: \frac{1}{p^2} : \frac{1}{a^2}$. From this proportion we get $x = \sqrt{\frac{a^2 + p^2}{2}}$, which determines the required point.

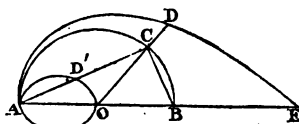
Similar to the above were the answers sent by Messrs. Andrew and Maffett.

Mr. Sheridan says, "By Prob. 96; p. 445, *Dealtry's Fluxions*, we have the two points in the circumf. of an ellipse, where the angular vel. is a max. and min.; whence the point which is a harmonic mean between them is given."

III.—Question (3), by Mr. D. T. SHERIDAN.—ABC is a semi-circle, AB the diameter, O the centre, and AC any chord; join CO, along which take CD always = $\frac{AC^3}{AB^2}$. Find the equation and area of the curve which is the locus of D.

Answered by Mr. J. BAINES, of Parbold Hall, near Wigan; and Mr. W. CLOUGH, Bradford, Yorkshire.

Join CB; put AO = OC = OB = r, and the $\angle BOC = 2\theta$; hence $\angle CAB = \theta$, AC = $2r \cos. \theta$, and $CD = \frac{AC^3}{AB^2} = 2r \cos.^3 \theta$; therefore OD, the polar



ordinate, = $r(1 \pm 2 \cos.^3 \theta)$, the upper sign taking place when CD is taken in OC produced, and the lower when it is taken the contrary way. When $\theta = 90^\circ$, OD = r, and when $\theta = 0^\circ$, OD = 3r, or -r, indicating that in both cases the curve commences at A, ends at E in the former, and at A in the latter, BE in AB produced being = AB. The inferior curve cuts the axis when $1 - 2 \cos.^3 \theta = 0$, or $\cos. \theta = \frac{1}{2} \sqrt[3]{4}$, and therefore $\theta = 37^\circ 28' 2'' \frac{1}{2}$, after which it lies on the other side of AB, forming an oval as in the fig.

Quadrature.— $\int \frac{1}{2} OD \times d2\theta = r^2 \int d\theta (1 \pm 2 \cos.^3 \theta)^2 = r^2 \int d\theta (1 \pm 4 \cos.^3 \theta + 4 \cos.^6 \theta) = r^2 \int d\theta (\frac{1}{8} \cos. 6\theta + \frac{3}{4} \cos. 4\theta \pm \cos. 3\theta + \frac{15}{8} \cos. 2\theta \pm 3 \cos. \theta + \frac{9}{4}) = r^2 (\frac{1}{48} \sin. 6\theta + \frac{3}{16} \sin. 4\theta \pm \frac{1}{3} \sin. 3\theta + \frac{15}{16} \sin. 2\theta \pm 3 \sin. \theta + \frac{9\theta}{4})$ = the area, which between $\theta = 0$, and $\theta = 90^\circ$, is = $r^2 (\frac{9\pi}{16} \pm \frac{9}{4}) = 6.200958r^2$ and $.867624r^2$ for the areas of the two curves required.

IV.—Question (4), by Mr. THOMAS TODD, Liverpool.—Given the least side (36), and the sum of three straight lines (48.41875) drawn from each of the angles of a plane triangle, to a point within it, so as to make the three angles formed thereby equal to one another, to construct geometrically the triangle.

Answered by Mr. N. J. ANDREW, Penzance.

On AB, the given side, form the equilateral triangle ADB, and describe a circle through the points ADB; then draw DC equal to the given sum of the "three straight lines drawn from the angles, &c."; join AC, BC, then will ABC be the triangle required, and O the point where the sides are seen under equal angles.

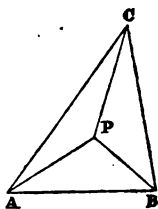
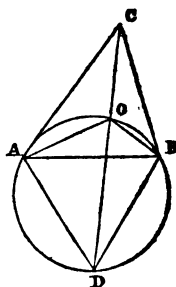
Demonstration.—From a known theorem we have $AO + BO = OD$, therefore $AO + BO + CO =$ the given sum from the construction. Again, from a familiar theorem, $\angle DOB = \angle DAB = 60^\circ$, also $\angle AOD = \angle ABD = 60^\circ$; therefore the angles about the point O, subtending the sides of the triangle ABC, are equal.

It is evident, from the preceding construction, that this question is not properly limited. The only restriction respecting the position of CD is, that AC and CB must be each greater than AB. Q. E. I.

Again, by Mr. H. CLAY, Moulton, Lincolnshire; and Mr. R. MAFFETT, Plymouth.

This question is not properly limited; for, from any point P, draw lines making equal angles with each other (of 120°). Between AP and BP apply $AB =$ given line; make $PC =$ given sum $-(AP + BP)$, and join AC, BC; then is ACB a \triangle answering the required conditions, provided AB be the least side. Now, that this may be the case, AP and BP must both be less than CP. To find these limits: suppose $AP = PC$, then by trigonometry, $AP = BP \cos. P +$

$\sqrt{AB^2 - BP^2 \sin.^2 P}$; but $\cos. P = -\frac{1}{2}$, and $\sin P = \frac{1}{2}\sqrt{3}$; therefore $AP = -\frac{1}{2}BP + \sqrt{AB^2 - \frac{3}{4}BP^2}$; whence, per hyp., $2AP + BP = 2\sqrt{AB^2 - \frac{3}{4}BP^2} =$ given sum $= S$; therefore



$$BP = \sqrt{\frac{4AB^2 - S^2}{3}}, \text{ and } AP = \frac{1}{2}\left(S - \sqrt{\frac{4AB^2 - S^2}{3}}\right);$$

therefore PB may vary between these limits, and every different position of AB will give a different Δ . It appears that when S is greater than $2AB$ there is no point in the Δ answering the required conditions, and when $S = 2AB$, P falls upon B.

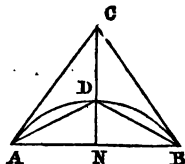
With the given numbers BP may range between 11.092 and 18.6608.

Let BP = 15; then AP = 15.0222, CP = 18.3915, and the sides are BC = 28.9699, and AC = 28.985. Again, let BP = 17, AP = 12.93, CP = 18.48375, BC = 30.738, AC = 27.346.

Again, by Mr. G. JONES, Liverpool.

This question seems to me not properly limited. Notwithstanding the sum of the lines drawn from the angles to the point within the triangle is a minimum by the data, it does not follow that the triangle is a maximum; however, I will find the sides of the triangle when isosceles, which probably gives the area a maximum.

On AB (= 26) describe a segment of a circle capable of containing an \angle of 120° ; bisect AB in N, and perpendicular thereto draw ND, meeting the segment in D; join AD and BD, produce DN to C, so that AD + BD + DC may be equal the given sum (46.4375); join AC and BC, then the triangle ABC will answer the required conditions.



Calculation:—By trigonometry, we have AD = AB = 15.0111; then CD = 18.4153; hence AC = BC = 28.997 = 29, nearly.

Remark.—AB being the least side, does not limit the question to the above construction.

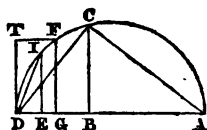
* * We are sorry that the insufficiency in the data of this question should have escaped our notice; but the remarks of our contributors are very just.

V.—Question (5), by Mr. JOHN CAM.—Given the time down the hypotenuse to construct the right angled triangle geometrically, when the difference of the hypotenuse and perpendicular is given or a maximum.

Answered by Mr. JESSE DAWSON, Ovington, Northumberland; and Mr. D. T. SHERIDAN.

Let AC be the hypotenuse of the right angled triangle ABC, and draw CD perpendicular to AC, meeting AB produced in D;

then the time down $AC =$ time down AD , therefore AD is given; and by similar triangles, as $AD : AC :: AC : AB$; whence $AD : (AD - AC) :: AC : (AC - AB)$; therefore, $AC : (AD - AC) = AD : (AC - AB)$, which is given. Hence the following



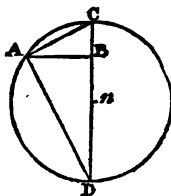
Construction.—In AD take $DE = AC - AB$; draw EI perpendicular to AD , meeting the semicircle described on AD in I ; draw tangent DT ; make $DT = DI$; draw TF , meeting the semicircle in F ; draw FG perpendicular to AD to the semicircle; apply $AC = AG$, and draw the perpendicular CB , and ACB is the required triangle.

Demonstration.— $AC \cdot (AD - AC) = (AG \cdot GD) = GF^2 = DI^2 = (AD \cdot AE) = AD \cdot (AC - AB)$. Q.E.D.

Note.— GF or DI will be a maximum when G is the centre, in which case $DE = \frac{1}{2} AD$.

Again, by Mr. W. CLOUGH, and Mr. G. DUCKET, Newcastle-upon-Tyne.

Analysis.—Suppose ABC the required triangle, and produce CB to meet AD perpendicular to AC ; then, because the time down the hypotenuse is given, the time down CD is given, and consequently CD is given. Now $CD : AC :: AC : CB$, or $CD : CD - AC :: AC : AC - BC$; whence the rectangle of $CD - AC$ and AC is also given, and consequently AC is given. Hence the following



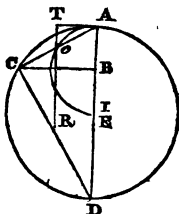
Construction is manifest:—Divide DC in n , so that the rectangle of Dn and nC shall be equal to the rect. of $CD - AC$ and AC . On DC as a diam. describe the circle CAD , and lay off the chord $AC = Cn$, and draw AB perpendicular to CD , and ABC will be the triangle required. The difference between AC , BC will be a max. when $Cn = nD$.

Again, by Mr. R. ABBATT, Brook Green.

Analysis.—Suppose ACB to be the required triangle; draw $CD \perp AC$, meeting AB produced in D ; then, by mechanics, AD is the space through which a body would freely fall in the given time, and consequently is given; make $AI = AC$, and BI will be given. Because $AB \cdot AD = AC^2 = AI^2$, $AB : AI :: AI : AD$, by division, $ID : AI :: IB : AB$, or $ID \cdot AB = AI \cdot IB$; that is, $(AD - BI - AB) AB = (AB + BI) BI$. Make $DG = BI$, and

($AG - AB$) AB , or $BG \cdot AB = AB \cdot BI + BI^2$; but $BG = BI + IG$; therefore $BI \cdot AB + IG \cdot AB = AB \cdot BI + BI^2$, or $IG \cdot AB = BI^2$; but $AG = AD - BI$, and BI are given; hence we derive the following

Construction.—Make AD equal to the space through which a body would freely fall in the given time, and DE equal twice the given difference; then, upon AE describe a semicircle, and draw $AT \perp AD$, and equal to $\frac{1}{2} DE$; draw $TR \parallel AD$, cutting the semicircle in c ; through c draw $Bc \perp$, meeting the circumference of a circle described upon AD as a diameter; join AC , and the triangle ACB is the one required.



When TR touches the circle AcE , the maximum state takes place; but when it neither cuts nor touches the circle, the problem is impossible.

VI.—Question (6), by Mr. RICHARD ABBATT.—Let θ be any circular arc, then $\cos.^2 \frac{1}{2}\theta = \frac{\sin.^2 \theta \operatorname{cosec} \theta}{2 \operatorname{cosec} \theta - 2 \cot \theta}$. Required the proof.

Answered by Mr. W. RUTHERFORD.

$$\text{Here } \cos.^2 \frac{1}{2}\theta = \frac{1 + \cos \theta}{2} = \frac{1 + \cos \theta}{2} + \frac{\sin.^2 \theta \tan \frac{1}{2}\theta \operatorname{cosec} \theta}{\sin.^2 \theta \tan \frac{1}{2}\theta \operatorname{cosec} \theta};$$

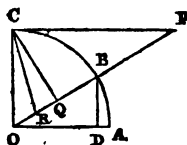
$$\text{but } \tan \frac{1}{2}\theta = \frac{\sin \theta}{1 + \cos \theta}; \text{ hence, by substitution, } \cos.^2 \frac{1}{2}\theta =$$

$$\frac{\sin.^2 \theta \operatorname{cosec} \theta}{2 \sin \theta \tan \frac{1}{2}\theta \operatorname{cosec} \theta} = \frac{\sin.^2 \theta \operatorname{cosec} \theta}{2 \tan \frac{1}{2}\theta}, \text{ because } \sin \theta \operatorname{cosec} \theta$$

$= 1$. Again, $\tan \frac{1}{2}\theta = \operatorname{cosec} \theta - \cot \theta$; therefore, by substitution,

$$\cos.^2 \frac{1}{2}\theta = \frac{\sin.^2 \theta \operatorname{cosec} \theta}{2 \operatorname{cosec} \theta - 2 \cot \theta}$$

Geometrically.—Let BD be the sine, CP the cotangent, and OP the cosecant of the arc AB . On PO take $PR = PC$; join CR , and demit the perpendicular CQ ; then it is demonstrated, geometrically, in *Gregory's Trig.*, chap. ii, prop. 7, that the square of the cosine of half any arc or angle is equal to a rectangle under half the radius and the covered sine of the whole arc; that is, $\cos.^2 \frac{1}{2} \text{arc } AB = \frac{1}{2} OC (OC + CQ)$. Now $\angle PCR = \angle PRC$, because $PC = PR$, and



therefore the complements of these angles OCR and QCR are equal; hence CR bisects $\angle OCQ$, and therefore $OR : OQ :: OC : OC + CQ :: OC^2 : OC(OC + CQ)$; but $OQ = BD$ and $OC^2 = BD \cdot OP$; therefore $OR : BD :: BD \cdot OP : OC(OC + CQ)$; and, by substitution, $\cos.^2 \frac{1}{2} \text{ arc } AB = \frac{1}{2} OC(OC + CQ) = \frac{BD^2 \cdot OP}{2OR} = \frac{BD^2 \cdot OP}{2OP - 2PC}$; hence, if $\text{arc } AB = \theta$, $\cos.^2 \frac{1}{2} \theta = \frac{\sin.^2 \theta \cos. \theta}{2 \text{ cosec. } \theta - 2 \cot. \theta}$.

Again, by Messrs. BAINES and GODWARD.

$$\text{Here } \frac{\sin.^2 \theta \text{ cosec. } \theta}{2 \text{ cosec. } \theta - 2 \cot. \theta} = (\text{by dividing by cosec. } \theta),$$

$$\frac{\sin.^2 \theta}{2 - 2 \cos. \theta} = \frac{1 - \cos.^2 \theta}{2(1 - \cos. \theta)} = \frac{1 + \cos. \theta}{2} = \cos.^2 \frac{1}{2} \theta. \text{ Q.E.D.}$$

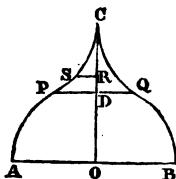
Solutions similar to the last were also sent by Messrs. Oakes and Kniveton, and Middlemiss.

VII.—Question (7), by Mr. ISAAC NEWTON.—In ACB the vertical section of, or cap or crown of a windmill whose summit is C, the curves AC, CB are each composed of two circular arcs of 60° each; being partly concave and partly convex towards AB, the diameter of the cap's base. Required the expense of painting the cap, supposing $AB = n$ yards, and that 1s. 6d. be given for 1 square yard.

Answered by Messrs. W. RUTHERFORD and DAWSON.

Let CO be the axis, and through the points of contrary flexure draw PQ, cutting CO in D; then the surface of the cap or crown below PQ is $pAB \times OD$, p being = 3.1415926535+; but $OD = \sin. 60^\circ = \frac{AO}{2} \sqrt{3}$, and $AB = n$;

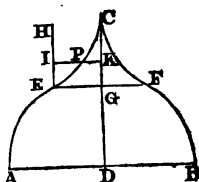
hence $pAB \times OD = \frac{1}{2} pn^2 \sqrt{3}$. Again, in CD take any variable distance CR, and let RS be the corresponding ordinate; then the fluxion of the surface is $2pSR \times dCS$; but, in circular arcs, $dCS : d \sin. CS = dCR : \text{rad.} = AO = \frac{1}{2} n$; $\cos. CS = \text{rad.} - \text{versed sin. } CS = \frac{1}{2} n - RS$; and from this analogy we have $SR \times dCS = \frac{1}{2} n (dCS - dCR)$; hence $2pSR \times dCS = np (dCS - dCR)$, of which the fluent is



πp (CS — CR), which is correct, and the surface of that part of the cap above PQ is $= \pi p$ (CP — CD) $= \pi p$ ($\frac{1}{2}\pi p - \frac{1}{2}\pi \sqrt{3}$) $= \frac{1}{2}\pi^2 p^2 - \frac{1}{2}\pi^2 \sqrt{3}$; hence the surface of the whole cap $= \frac{1}{2}\pi^2 p^2$, which, at 1s. 6d. per square yard, gives $\frac{1}{2}\pi^2 p^2$ shillings, the expense of painting the cap.

Again, by Mr. H. CLAY.

By Mens. the curve surface of the spherical zone, of which AEFB is a section, is $\pi AB \cdot DG = \frac{1}{2}\pi n^2 \sqrt{3}$ (DG being $= \sin. 60^\circ = \frac{1}{2}n\sqrt{3}$). Let H be the centre of the circle to arc EC. Now EG is $= \frac{1}{2}n$ (being $= \cos. 60^\circ$, and also $= \sin. 60^\circ$ to rad. EH, therefore $\frac{EH}{2} \sqrt{3} = \frac{1}{2}n$, or $EH = \frac{n}{2\sqrt{3}} = \frac{1}{3}n\sqrt{3}$, and CG $= \text{versed sin. } 60^\circ = \frac{1}{2} \text{ rad.} = \frac{1}{2} \pi \sqrt{3}$.



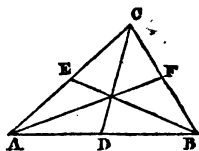
But $EP = \phi$; then is $IP = \sin. \phi$, and $PK = \frac{1}{2}n - \sin. \phi$. Whence the curve surface generated by the revolution of EPKG about KG $= 2\pi \int PK d\phi = 2\pi \int d\phi (\frac{1}{2}n - \sin. \phi) = 2\pi (\frac{1}{2}n\phi + \text{rad.} \times \cos. \phi)$; which, between $\phi = 0^\circ$, and $\phi = \text{circ. arc of } 60^\circ$, to rad. $\frac{1}{2}\pi\sqrt{3}$, becomes $\frac{1}{3}\pi n^2 \pi \{ \pi \sqrt{3} - 3 \}$, the whole of the curve surface generated by the revolution of EP. Hence the entire surface of the cap is $\frac{1}{3}\pi n^2 \pi \{ \pi \sqrt{3} - 3 \} + \frac{1}{2}\pi n^2 \sqrt{3} = \frac{1}{3}\pi n^2 \pi \{ (\pi + 9) \sqrt{3} - 3 \} = 1.5734\pi^2 \text{ yards.}$ Hence the cost of the painting $= 1.5734\pi^2 \times \frac{3}{40} = \mathcal{L}.118005\pi^2$.

Cor. The above surface differs from that of the hemisphere by .0026 π^2 .

VIII.—Question (8), by Mr. THOMAS TODD.—Suppose each of the sides of a plane triangle to be bisected by straight lines drawn from the opposite angles; now, there is given each of the three differences between each bisecting line and the side which it bisects, to construct the triangle.

Answered by Messrs. W. GODWARD and R. MAFFETT.

Put $AB = x$, $AC = y$, $BC = z$; and $AB \oslash CD = a$, $AC \oslash EB = b$, $BC \oslash EF = c$. Then $CD = x \pm a$, $EB = y \pm b$, $AF = z \pm c$. Now, by an elementary theorem, $y^2 + z^2 = \frac{1}{2}x^2 + 2(x \pm a)^2$, or $x^2 + y^2 + z^2 = \frac{1}{2}x^2 \pm 4ax + 2a^2$. In like manner $x^2 + z^2 = \frac{1}{2}y^2 + 2(y \pm b)^2$, or $x^2 + y^2 + z^2 = \frac{1}{2}y^2 \pm 4by + 2b^2$; and $x^2 + y^2 = \frac{1}{2}z^2 + 2(z \pm c)^2$, or $x^2 + y^2 + z^2 = \frac{1}{2}z^2 \pm 4cz + 2c^2$. Hence, $\frac{1}{2}x^2 \pm 4ax + 2a^2 = \frac{1}{2}y^2 \pm 4by + 2b^2 = \frac{1}{2}z^2 \pm 4cz + 2c^2$. The resolution of the first and third of



these equalities gives $x = \pm \left\{ (z \pm \frac{1}{2}c)^2 + \frac{1}{4}b(c^2 - a^2) \right\}^{\frac{1}{2}} \mp$

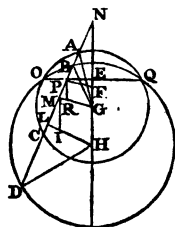
$\frac{1}{2}a$; and of the second and third, $y = \pm \left\{ (z \pm \frac{1}{2}c)^2 + \frac{1}{4}a(c^2 - b^2) \right\}^{\frac{1}{2}} \mp \frac{1}{2}b$. These values of x and y being substituted

in the equation $x^2 + y^2 = \frac{1}{2}z^2 + 2(z \pm c)^2$, there will result an equation from which z may be determined, and hence the values of x and y .

IX.—Question (9), by Mr. RICHARD ABBATT.—Through a given point in the common chord of two given intersecting circles, to draw a straight line, so that the segments intercepted by the circles shall have a given ratio.

Answered by Mr. JOHN BAINES.

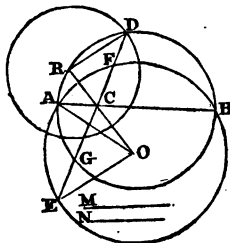
Let AOCQ, BODQ be the two circles intersecting each other in O and Q, QO the common chord, and P the given point in it. Supposing the line APD drawn, such that $AP : PD :: 1 : m$; from the centres H, G demit the perp. HL, GM, and draw the other lines as in the fig. Putting $PE = a$, $GE = b$, $GH = MI = c$, and the angle $NPE = PFE = PRM = MIL = x$, we have $EF = a \cot. x$, $PF = GR = a \operatorname{cosec}. x$, $FG = PR = b - a \cot. x$, $PM = b \sin. x - a \cos. x$, $MR = b \cos. x - a \cot. x \cos. x$,



$GM = HI = b \cos. x + a \sin. x$, $LM = c \sin. x$, $LI = c \cos. x$, and $LH = (c + b) \cos. x + a \sin. x$. Put $BG = r$, and $DG = R$, then $AM = CM = \sqrt{r^2 - (a \sin. x + b \cos. x)^2}$, and $BL = DL = \sqrt{R^2 - \{a \sin. x + (c + b) \cos. x\}^2}$; hence $AP : PD :: 1 : m$, becomes $\sqrt{r^2 - (a \sin. x + b \cos. x)^2} - b \sin. x + a \cos. x : (c + b) \sin. x - a \cos. x + \sqrt{R^2 - \{a \sin. x + (b + c) \cos. x\}^2} :: 1 : m$, which, being reduced, produces a biquadratic equation of the quadratic form, from which x may be found.

Again, by the PROPOSER.

Analysis.—Let the given circles ABE , ABD intersect each other in A, B , and let $M : N$ be the given ratio, C the given point in the chord AB , and $EGCFD$ the line to be drawn. Because $EG : DF :: M : N$, and, by the circle, $EC : CF = AC : CB = GC : CD$, or $EC : CD :: GC : CF$; by division, $EC : CD :: EC - GC : CD - CF$ or $EG : FD :: M : N$. Join OC , and produce it to R , so that $CO : CR :: M : N$, and join RD ; then $CO : CR :: CE : CD$, therefore the triangles CEO and CDR are similar, and $EO : CO :: CR : RD$; but EO, CO , and CR are known, hence RD and the point D are given.



Construction.—Join OC and produce it to R , so that $CO : CR :: M : N$; draw the radius AO , and take $RD : AO :: N : M$; then with radius RD and centre R describe a circle intersecting the circle ABD in D ; draw $DFCGE$, and this is the line required.

X.—Question (10), by Mr. JOHN COLLINS.—A certain sum was spent at a public dinner, which was paid with sovereigns, seven shilling pieces, shillings, and sixpences: now it was observed that the product of the number of pieces was the greatest possible, and that the whole sum spent was the least the condition of the question would admit of: required the number of each sort, and the sum spent.

Answered by Mr. W. GODWARD.

Let x, y, z , and v , represent the number of sovereigns, seven shilling pieces, shillings, and sixpences; w the product of the

number of pieces; and w the whole sum spent; then, per question, $40x + 14y + 2z + v = w$, and $u = xyzv = \text{a maximum}$. The first equation gives $v = w - 2z - 14y - 40x$, which, substituted in the second, gives $u = xyz(w - 2z - 14y - 40x)$, a maximum. The differential coefficients of the first order are

$$\frac{du}{dx} = yz(w - 2z - 14y - 80x)$$

$$\frac{du}{dy} = xz(w - 2z - 28y - 40x)$$

$$\frac{du}{dz} = xy(w - 4z - 14y - 40x).$$

The factors within the parenthesis of each being put $= 0$, and, solved, give $x = \frac{w}{160}$, $y = \frac{w}{56}$, $z = \frac{w}{8}$, and $v = \frac{w}{4}$. On examining

the partial differential coefficients of the second order by the criterion given in most works on the differential calculus, it will be found that the preceding result determines u a maximum. It now only remains to find the value of w , which, to answer the last condition of the question, must evidently be the least common multiple of 160 and 56. This, by Art. 877, *Wood's Algebra*, is $= \frac{160 \times 56}{8} = 1120 = w$; therefore the sum spent is 1120 six-

pences = £28; also $x = 7$, $y = 20$, $z = 140$, and $v = 280$.

Again, by Mr. N. J. ANDREW.

Let v, x, y , and z respectively denote the number of sovereigns, seven-shilling pieces, shillings, and sixpences; then $vxys = \text{max.} = m$, or $\frac{m}{vxys} = 1$; this in fluxions, considering m constant,

gives $-\frac{m\dot{v}}{v^2xyz} - \frac{m\dot{x}}{x^2vys} - \frac{m\dot{y}}{y^2vxs} - \frac{m\dot{z}}{z^2vxy} = 0 \dots (A)$; also,

from the question, $20\dot{v} + 7\dot{x} + \dot{y} + \frac{1}{2}\dot{z} = 0 \dots (B)$. Now, considering the equations A, B equal, and respectively equating

the homologous terms in each, we have $-\frac{m\dot{v}}{v^2xyz} = 20\dot{v}$, $-\frac{m\dot{x}}{x^2vys}$

$= 7\dot{x}$, $-\frac{m\dot{y}}{y^2vxs} = \dot{y}$, and $-\frac{m\dot{z}}{z^2vxy} = \frac{1}{2}\dot{z}$; and from these equa-

tions there result $1 = -\frac{m}{20v^2xyz} = -\frac{m}{7x^2vys} = -\frac{m}{y^2vxs} = -$

$\frac{m}{\frac{1}{2}x^2vxy}$, and ultimately $20v = 7x = y = \frac{1}{2}x$. And since v , x , y , and z must be integers, the least value we can assign to v is 7; then $x = 20$, $y = 140$, and $z = 280$: hence the whole sum spent = £28. It further appears that there was an equal part paid in sovereigns, seven-shilling pieces, shillings, and sixpences.

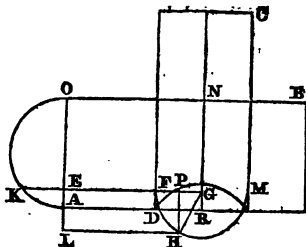
Again, by Mr. W. RUTHERFORD.

Let x , y , z , and w denote respectively the number of sovereigns, seven-shilling pieces, shillings, and sixpences; then if $40x + 14y + 2z + w$, or the sum spent be a minimum, and $xyzw$ be a maximum, we may suppose first x and y to be constant; whence $2z + w = 0$, and $zw + z^2 = 0$; from which we have $w = 2z$. Again, suppose x and w to be constant; then $14y + 2z = 0$, and $yz + y^2 = 0$; therefore $z = 7y$. In like manner, by supposing z and w to be constant, we have $20x = 7y$; consequently $x = 7$, $y = 20$, $z = 7y = 140$, $w = 2z = 280$, and the whole sum spent is £28.

XI.—Question (11), by Mr. WILLIAM JACOBS.—It is required to find the equation of the projection of the intersection of two unequal right cylinders, their axes being at right angles to each other, and the projection to be made on a plane passing through the axes.

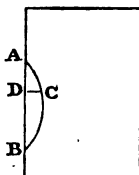
Answered by Mr. W. GODWARD.

Let AB and CD represent the two cylinders; draw any line EFG parallel to AD, and with the centre G and radius GF describe the semicircle FHM. Make EL = EK; draw LH parallel to EG, intersecting the semicircle in H, and demit HP perpendicular to FG: P is a point in the projection. Put NR = a , GF = GH = b , NG = OE = x , and GP = y ; then EA = GR = $a - x$, HP = BL = EK = $ax - x^2$, and GP = GH² - HP², or, in symbols, $y^2 = b^2 - ax + x^2$, an equation to the projection.



Again, by Mr. N. J. ANDREW.

I consider this question equivalent to the following one:—Suppose a given cylinder to have a given circular perforation through it perp. to its axis; required the nature of the curve which is the projection of the edge of the orifice, on the common plane passing through both their axes. This being premised, let A, B, C denote the required curve, and put $AD = x$, $CD = y$, the diameter of the cylinder $= a$, the diameter of the orifice $= b$. Now, from a little consideration it appears, that $\sqrt{(bx - x^2)}$ will express the perpendicular distance from C to the point that projects it; it also appears, that this distance is defined by $\sqrt{(ay - y^2)}$, by considering it as an ordinate in the section of the cylinder which passes through the same point. Hence $y^2 - ay - x^2 + bx = 0$, an equation to the hyperbola.



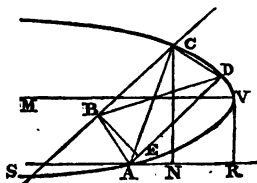
Again, by Mr. C. GILL, Seamer, near Scarborough.

Let a and b be radii of the two cylinders, x the distance from a point in the axis of a to the intersecting plane of b , and y the perpendicular from the axis upon the intersecting chord; then $b^2 - (b - x)^2 = a^2 - y^2$, or $y^2 = a^2 - 2bx + x^2$, an equation to the hyperbola, and the projected point.

XII.—Question (12), by Mr. THOMAS COLLINS.—Two angles of 45° , BAC, BDC, being given in position, and making them turn on their fixed vertices A, D, in such a manner that the two sides AB, BD, may always intersect each other in a line parallel to the lines joining the vertices AD, it is required to find the nature of the curve described by the intersection C of the other two sides AC, DC.

Answered by Mr. C. GILL.

Let the revolving angles contain θ° ; draw SAR, so that $\angle RAD = \theta$, and upon it let fall the \perp CN. Let $AD = a$, BE (= the distance of the line parallel AD in which B is found) $= b$, $NAC = DAB = \phi$, $AN = x$, $CN = y$, and $AC = v$. Then $AE = b \cot. \phi$, and $DE = a - b \cot. \phi$; whence $\cot.$



$$\text{ADB} = \frac{a - b \cot. \phi}{b}. \text{ Now, } v = \frac{a \sin. \text{ADC}}{\sin. \text{ACD}} = \frac{a \sin. (\text{ADB} + \theta)}{\sin. (\text{ADB} + \phi)}$$

$$= \frac{a \sin. \theta \cot. \theta + \cot. \text{ADB}}{\sin. \phi \cot. \phi + \cot. \text{ADB}} = \frac{\sin. \theta}{\sin. \phi} \{ a + b(\cot. \theta - \cot. \phi) \},$$

the polar equation of the curve to pole A. Again, $y = v \sin. \phi = \sin. \theta \{ a + b(\cot. \theta - \cot. \phi) \}$; therefore $\cot. \phi = \frac{b \cos. \theta + a \sin. \theta - y}{b \sin. \theta}$, and $x = y \cot. \phi = \frac{y}{b \sin. \theta} (b \cos. \theta + a$

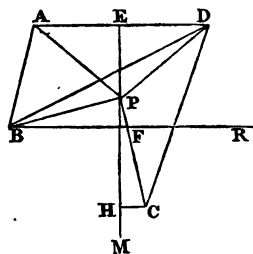
$\sin. \theta - y)$, or $bx \sin. \theta = (a \sin. \theta + b \cos. \theta) y - y^2$, which shews the curve to be a parabola whose axis is parallel to SAR. Suppose V its vertex, and let fall the \perp VR; let AR = c, and VR = d; then substituting $c - x'$ for x, and $y' - d$ for y, we get the equation to the new axis, $bx' \sin. \theta = bc \sin. \theta + (a \sin. \theta + b \cos. \theta) d + d^2 - (a \sin. \theta + b \cos. \theta + 2d) y' + y'^2$. Hence $d = -\frac{1}{2}(a \sin. \theta + b \cos. \theta)$, and $c = \frac{(a \sin. \theta + b \cos. \theta)^2}{4b \sin. \theta}$;

therefore the equation becomes $bx' \sin. \theta = y'^2$, b in θ being its perimeter.

Corollary.—The converse is also true: viz. let any line AD be drawn cutting a given parabola in A and D, and making a given $\angle (\theta)$ with its axis; let c be any point in the curve, and join CD, CA; draw DB, AB, intersecting in B, and making angles CDB and CAB each = θ . Then the locus of the point B is a straight line, parallel to AD, and at a distance = perimeter $\times \text{cosec. } \theta$ from it.

Again, by Mr. G. JONES.

Bisect AD in E, and draw EM perpendicular thereto, intersecting the parallel BR in F; to any point P in EM draw AP and DP, which are evidently equal; let PB be drawn to meet BR in B, so as to be equal to AP; draw, also, PC at right angles to BP, and equal thereto; join BA, BD, CA and CD; then, if a circle whose centre is P and radius PA or PD be described, the same will pass through the points P and C. Now, since the \angle BPC is a right \angle , the angles BAC and BDC are each equal to half a right angle, (being at the circumference). Put $a = \text{AF}$ or ED, $b = \text{EF}$; draw CH perpen-



dicular to EM, to meet the same in H; then, if x be $= FH$, and $y = CH$, the triangles BPF and PCE being similar and equal in all respects, therefore we have $PB^2 = PA^2 = a^2 + b^2 - 2by + y^2 = n^2 - 2by + y^2$ ($n^2 = a^2 + b^2$), and $BF^2 = BP^2 - PF^2 = n^2 - 2by$; hence $\sqrt{n^2 + 2by} + y = n$. Take any other position, such as $B'P'$, $P'C'$, then we shall have $C'H' = F'P'$; in this case $\sqrt{n^2 + 2by} + y$ is $= x$; hence $x = \sqrt{n^2 + 2by} \pm y$, the equation of the curve, which is a line of the second order.

Again, by Mr. R. ABBATT.

This question is a particular case of *Leslie's Curve Lines*, page 274, where the curve is determined geometrically. An algebraical investigation may be seen in *Maclaurin's Algebra*, Part 3, page 340. It was originally proposed by Newton, for describing the conic sections mechanically.

XIII.—Question (18), by Mr. ROBERT MAFFETT.—Transform the following formulæ into squares, viz. $n^2 + n + 1$, $m^2 + m + 1$, and $n^2 + nm + m^2$.

Answered by Mr. J. BAINES.

Assuming $n^2 + mn + m^2 = (n + \frac{2}{3}m)^2 = n^2 + \frac{4}{3}mn + \frac{4}{9}m^2$, and $n^2 + n + 1 = (rn - 1)^2 = r^2n^2 - 2rn + 1$, we have $m = \frac{3}{2}n$, and $n = \frac{2r+1}{r^2-1}$; hence $m^2 + m + 1 = \frac{25r^4 + 30r^3 + r^2 + 6r + 19}{25(r^2 - 1)^2}$.

Putting the numerator of this expression $= (5r^2 + 3r - \frac{4}{3})^2 = 25r^4 + 30r^3 + r^2 - \frac{24r}{5} + \frac{16}{25}$, we have $r = -\frac{17}{10}$, and hence if $t - 1.7$ be assumed $= r$, $25r^4 + 30r^3 + r^2 + 6r + 19$ becomes $25t^4 - 140t^3 + 281.5t^2 - 226.6t + 73.1025$, which, equated with $(5t^2 - 14t - 8.55)^2 = 25t^4 - 140t^3 + 110.5t^2 + 239.4t + 73.1025$, gives $t = \frac{52}{19}$; therefore $r = \frac{197}{190}$, $n = \frac{110960}{2709}$, and $m = \frac{22192}{903}$, which answer.

Again, by Mr. R. MAFFETT.

Assume $m = \frac{3}{2}n$, then the third formula becomes $49n^2$ a square; and, by substituting this value of m in the second formula, we

have $n^2 + n + 1$, and $25n^2 + 15n + 9$, to make squares. Equate the first to $(n-a)^2$, then $n^2 + n + 1 = n^2 - 2na + a^2$, from which $n = \frac{a^2 - 1}{2a + 1}$. Assume $a = r - 1$, then $n = \frac{r^2 - 2r}{2r - 1}$; and this being substituted in the second formula, gives, after construction, $25r^4 - 70r^3 + 61r^2 - 6r + 9$, to be made a square. Call its root $5r^2 - 7r - 3$, then $25n^4 - 70n^3 + 61r^2 - 6r + 9 = 25r^4 - 70r^3 + 40r^2 - 30r^2 + 42r + 9$; from which $r = \frac{8}{7}$ and $n = -\frac{16}{63}$, and the numbers are $\frac{57}{63}$, $\frac{73}{63}$, and $\frac{112}{63}$, which numbers will solve the question; and the squares become $\frac{3249}{3969}$, $\frac{5329}{3969}$, and $\frac{12544}{3969}$, or in whole numbers 3249, 5329, and 12544.

Again, by Mr. N. J. ANDREW.

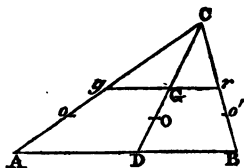
It is evident, if we take $n = 0$, the first two formulæ will be squares, and we have only to make $m^2 + m + 1 = \square$, equate it with $(m + s)^2$, and there results $m^2 + m + 1 = m^2 + 2ms + s^2$; therefore $m = \frac{1 - s^2}{2s - 1}$, where s may be any number greater than $\frac{1}{2}$ and less than 1.

There were other ingenious solutions sent to this question, which we reluctantly omit.

XIV.—Question (14), by Mr. GRIFFITH JONES.—Let ABC be an angular pendulum composed of two cylindrical wires, AC and BC, of unequal lengths, vibrating on the point of suspension (C), in the plane of the figure; required the respective distances of the centres of gravity, oscillation, and gyration, from the point of suspension.

Answered by Messrs. CLAY and ANDREW.

Let AC = a , BC = b , and AB = C ; bisect AC and BC in g and r , and make $gG : Gr :: Cr : Cg$; draw CGD; then will g , r , G be the centres of gravity of AC, BC, and AC + BC respectively; also, let o , o' , O be their respective centres of oscillation, and O' the centre of gyration of AC + BC;



then, by known properties, $Co = \frac{1}{2}a$, $Co' = \frac{1}{2}b$, $CO = \frac{AC \cdot Cg \cdot Co + BC \cdot Cr \cdot Co}{(AC + BC) \cdot CG} = \frac{1}{2} \cdot \frac{a^2 + b^2}{(a + b) CG}$, and $CO : CO' :: CO' : CG$, or $CO' = \sqrt{CO \cdot CG} = \sqrt{\frac{1}{2} \cdot \frac{a^2 + b^2}{a + b}}$.

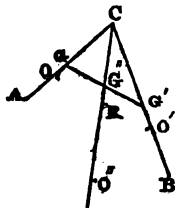
To find CG , we have, by trigonometry, $\sin. \frac{1}{2}gGC = \frac{\sqrt{(a + b - c) \cdot (b + c - a)}}{4ac}$; and since $gG : Gr :: Gr : Cg$, or, by comparison, $gG + Gr (= gr = \frac{1}{2}C) : gG :: Cg + Cr (= \frac{a + b}{2}) : Cr (= \frac{b}{2})$; therefore $gG + \frac{1}{2} \cdot \frac{cb}{a + b}$, whence $CG = \frac{1}{2} \sqrt{(a - 2gG)^2 + 4a \cdot 2gG \sin.^2 \frac{1}{2}gGC}$ becomes $\frac{1}{2} \cdot \frac{1}{a + b} \sqrt{(a^2 + b^2)(a + b) - ab^2}$; whence $CO = \frac{1}{2} \cdot \frac{\sqrt{(a^2 + b^2)(a + b) - ab^2}}{a^2 + b^2}$.

Corollary 1.—It appears that CO' , the distance of the centre of gyration from the point of suspension, is independent of the $\angle C$, for C does not enter into its value.

Corollary 2.—When ACB becomes a right line, or $C = a + b$, CO is $= \frac{1}{2} \cdot \frac{a^2 + b^2}{a^2 + b^2}$, which, when $a = b$, is $= \infty$, shewing that it would rest on the centre of gravity in any position. Again, when C is zero, or AC, CB coincide, CO becomes $\frac{1}{2} \sqrt{\frac{a^2 + b^2}{a + b}} =$, when $a = b$, $\frac{1}{2}a$, as it ought, being then a right line suspended from one extremity.

Again, by Messrs. ABBATT and GILL.

Let ACB be the compound pendulum, vibrating about C in the plane of the figure; G, O the centres of gravity and oscillation of AC , and G', O' of CB ; and let G'', O'', R be the centres of gravity, oscillation, and gyration of the system. Join CG' , and bisect the angle ACB by a line intersecting GG' ; make GG'' equal to the greater segment of GG' , and G'' will be the centre of gravity. Again, *Whewell's Dynamics*, art. 90, the moment



of inertia of AC about C = AC . CG . GO, and that of BC about C = BC . CG' . CO'; hence, the whole moment of inertia = AC . CG . GO + BC . CG' . CO'; therefore $CO'' = \frac{AC \cdot CG \cdot GO + BC \cdot CG' \cdot CO'}{(AC + BC) \cdot CG} = \frac{AC \cdot \frac{1}{2}AC \cdot \frac{1}{2}AC}{(AC + BC) \cdot CG} + \frac{BC \cdot \frac{1}{2}BC \cdot \frac{1}{2}BC}{(AC + BC) \cdot CG} = \frac{AC^3 + BC^3}{8CG(AC + BC)}$. Also, the inertia of AC revolving about C = $\frac{1}{2}AC^3$, and of BC = $\frac{1}{2}BC^3$; hence the whole inertia of the system = $\frac{1}{2}(AC^3 + BC^3)$; therefore, $CR = \sqrt{\frac{AC^3 + BC^3}{3(AC + BC)}}$. Hence it appears that CR is a mean proportional between CG'' and CO''.

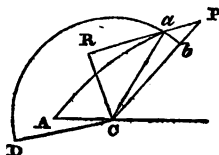
XV.—Question (15), by Mr. H. CLAY.

Of this question several of our contributors have observed to us, that it was published in the "*Ladies' Diary for 1824*," being from the pen of Mr. Rutherford. It is needless for us to remark, that no one acquainted with Mr. Clay's mathematical acquirements will accuse him of plagiarism, but will readily allow that he sent it to us fancying it original; nor did we suppose it otherwise when we inserted it.

XVI.—Question (16), by M. M.—If u be the reciprocal of the radius vector, θ the vectorial angle, and ρ the radius of curvature at an apse $\frac{1}{\rho} = u + \frac{d^2u}{d\theta^2}$.

Answered by Mr. C. GILL and Mr. W. RUTHERFORD.

Let CP be the radius vector, A an apse, and CD the given line; let aP be a very small arc of the curve, and PR a tangent at the point P; draw CR perpendicular to PR, and with radius Ca and centre C describe the arc Dab. Then, since $CP = u$, and arc $Db = \theta$, we have $Pb = du$, and $ab = d\theta$; whence $aP = (du^2 + d\theta^2)^{\frac{1}{2}}$, and by the similar triangles Pba, PCR, we have $aP : ab :: PC :$



$CR = \frac{ud\theta}{(du^2 + d\theta^2)^{\frac{1}{2}}}$. But the radius of curvature at the point P

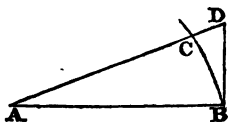
is $= \frac{u du}{dCR}$ (*Dealtrey's Fluxions*, Art. 119); and this, by substituting the value of dCR , and dividing both numerator and denominator by du , becomes $\frac{u (du^2 + d\theta^2)^{\frac{3}{2}}}{du^2 d\theta + u du d^2\theta + d\theta^3 - u d^2u d\theta}$. Now, at an apse, u is either a maximum or a minimum, and therefore $du = 0$; consequently the last expression gives $\frac{1}{\rho} = \frac{u d\theta^2}{d\theta^3 - u d^2u d\theta} = \frac{u d\theta^2}{d\theta^3 - u d^2u}$; hence $\frac{1}{\rho} = \frac{1}{u} - \frac{d^2u}{d\theta^2}$, and not $= u + \frac{d^2u}{d\theta^2}$.

Note.—If, instead of putting the arc $Db = \theta$, we suppose the angle $DCP = \theta$, the resulting theorem is $\frac{1}{\rho} = \frac{1}{u} - \frac{d^2u}{u^2 d\theta^2}$.

Again, by M. M. the PROPOSER.

Demonstration.—This might easily be given from the general expressions of the radius of curvature, in terms of differential coefficients; but I prefer giving a particular demonstration for this case.

Let B be the apse, and AC a radius vector drawn indefinitely near to AB , and produced to meet the tangent in D . The simplest expression for the radius of curvature at B is $\frac{DB^2}{CD}$; therefore $\frac{1}{\rho} = 2 \frac{CD}{BD^2}$.



Now $CD = AD - AC = \frac{1}{u \cos. BAD} - \frac{1}{u'}$, when u' is what u

becomes when θ is increased by $d\theta$, or $u + \frac{du}{d\theta} \cdot d\theta + \frac{d^2u}{d\theta^2} \cdot \frac{d\theta^2}{1.2}$

+ &c., which becomes in this case $u + \frac{d^2u}{d\theta^2} \frac{d\theta^2}{1.2} + \&c.$ Substi-

tute this, expand $\cos. BAD$ in terms of BAD or $d\theta$, perform the divisions in both terms as far as all the terms containing the squares of $d\theta$, and the result is $CD = \left(\frac{1}{u} + \frac{1}{u^2} \frac{d^2u}{d\theta^2} \right) \frac{d\theta^2}{1.2} + \&c.$,

and BD^2 is $\frac{d\theta^2}{u^2}$; therefore $\frac{1}{\rho}$ or $\frac{ACD}{BD^2}$ is $u + \frac{d^2u}{d\theta^2}$. Q.E.D.

Again, by Mr. G. JONES!

I shall take the liberty of changing the data in this question to the following:—viz. $\ell = u + \frac{d^2u}{d\theta^2}$; then, by assuming $p =$ the perpendicular on the tangent from the centre of force, $\ell = \frac{\ell d\ell}{dp} = u + \frac{d^2u}{d\theta^2}$; but, by a well-known property, $p : \sqrt{u^2 - p^2} :: u d\theta : du$, which gives $\frac{du^2}{d\theta^2} = \frac{u^4}{p^2} - u^2 = 0$ (since at an apse p is $= u$). Assume $d\theta$ constant, then, by differentials, $\frac{du^2}{d\theta} = 0$, we have $\frac{d^2u}{d\theta^2} = 0$; hence $\frac{\ell d\ell}{dp} = u = \ell$, the radius of curvature.

. This question, as printed in our first number, is incorrect, an omission having been made at the press: the above is the question corrected, and as sent to us by the Proposer.

XVII.—Question (17), by Mr. ROBERT MAFFETT.—If a globe of ash 10 feet diameter be depressed in water till it is level with the surface, and then be suffered to ascend, it is required to determine the time of its ascent.

Answered by Messrs. GODWARD and GILL.

Let $a =$ diameter of the globe, $p = .5236$, $g = 16\frac{1}{2}$ ft., $n = .845$ the specific gravity of ash, that of water being 1, x any variable height through which the globe has ascended, t the corresponding time of ascent, and v the velocity at the end of that time; then $a - x$ is the height of the segment still immersed in the water, the solidity of which is $p(a^3 - 3ax^2 + 2x^3)$, which is equivalent to the force of the water raising the globe; but $p \times a^3 \times n = a^3pn$ is the weight of the globe opposing its ascent; hence the effective force of the water to raise the globe is $p(1 - n) \cdot a^3 - 3ax^2 + 2x^3$, which, being divided by a^3pn , the mass of the globe, gives $\frac{(1 - n) \cdot a^3 - 3ax^2 + 2x^3}{a^3n} = f$, the accelerating force. Again, by dynamics, $vdv = 2gf dx = \frac{2g}{a^3n}$

$\{ (1-n) \cdot a^3 dx - 3ax^2 dx + 2x^3 dx \}$; hence, by integrating,
 $v^2 = \frac{4g}{a^3 n} \{ (1-n) \cdot a^3 x - ax^2 + \frac{1}{2} x^4 \}$, and $v = \frac{2\sqrt{g}}{a\sqrt{an}}$
 $\sqrt{ \{ (1-n) a^3 x - ax^2 + \frac{1}{2} x^4 \} }$. Now, when the globe has ac-
 quired its greatest height, $v = 0$; and in this case we obtain,
 after a little reduction, $x^3 - 2ax^2 + (2-2n) a^3 = 0$; or, in
 numbers, $x^3 - 20x^2 + 310 = 0$, the resolution of which gives x
 $= 4.4674471$. Lastly, $dt = \frac{dx}{v} = \frac{a\sqrt{an} \cdot dx}{2\sqrt{g}} \{ (1-n) a^3 x -$
 $ax^2 + \frac{1}{2} x^4 \}^{-\frac{1}{2}}$. This expression being thrown into a series, and
 the correct integrals taken, will give t , the time required.

Again, by Mr. JOHN BAINES.

Taking the specific gravity of ash = .8, that of water being 1,
 and putting x = the part of the globe's diameter out of water,
 $10 - x$ = the part within, and $1000 - 30x^2 + 2x^3$ and 800 are
 proportional to the weight of the water occupied by the immersed
 part, and the weight of the globe. The difference of these two,

divided by the mass moved, gives $\frac{100 - 15x^2 + x^3}{400}$ = the accele-

rating force; hence $v dv = 2g \int dx = \frac{g}{200} \cdot dx (100 - 15x^2 + x^3)$,

which gives $v = \frac{\sqrt{g}}{20} \sqrt{400x - 20x^3 + x^4}$. When $v = 0$, the
 globe ceases to rise out of the water, and x then is = 5.19285 ft.

Again, $dt = \frac{dx}{v} = \frac{20}{\sqrt{g}} \cdot \frac{dx}{\sqrt{400x - 20x^3 + x^4}}$, which, being con-

verted into an infinite series, and integrated, gives $t = \frac{20}{\sqrt{g}} \cdot x^{\frac{1}{2}}$

$\left(\frac{1}{10} + \frac{x^2}{2000} - \frac{x^3}{56000} + \frac{x^4}{96000} - \frac{x^5}{1113200} + \&c. \right) = 1.307''$

(when $x = 5.19285$), the time required.

Again, by Mr. RUTHERFORD.

Let the diameter of the sphere be denoted by a , 3.1415926535
 by p , the specific gravity of ash by m , and that of water by unity.
 Let x denote any variable height through which the sphere has
 ascended, v the velocity of ascent corresponding to the height x , and
 $g = 16\frac{1}{2}$ feet; then the weight of the sphere = $\frac{1}{2}a^3mp$, and $a - x$

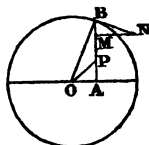
being the part of its axis still immersed in the water, $\frac{1}{6}p(a-x)^2 \times \{3a - 2(a-x)\} = \frac{1}{6}p(a+2x)(a-x)^2$ is the force of the water upwards to raise the globe; hence the efficacious force to raise the globe is $\frac{1}{6}p\{(a+2x)(a-x)^2 - ma^3\}$, which, being divided by $\frac{1}{6}a^2mp$, the mass moved, gives the accelerating force $= \frac{(a+2x)(a-x)^2 - ma^3}{ma^3}$; therefore $v\dot{v} = 2gx \times \frac{(a+2x)(a-x)^2 - ma^3}{ma^3}$, and the fluents give $v^2 = \frac{2g}{ma^3} \times \{2a^2x(1-m) - x^2(2a-x)\}$, or, by putting $1-m=n$, we have $v = \sqrt{\frac{2g}{ma^3} \times \{2a^2nx - x^2(2a-x)\}^{\frac{1}{2}}}$; but when the globe has reached its greatest ascent, $v=0$, and therefore $2a^2nx - x^2(2a-x)=0$; hence $x^3 - 2ax^2 + \frac{31}{100}a^3 = 0$, because $n = 1-m =$ the difference between the specific gravities of water and ash $= 1 - .845 = .155 = \frac{31}{200}$; consequently $x = .44674472a =$ (when $a=10$) $4.4674472 =$ the part of the axis that rises above the surface of the water. Now, to find the time t corresponding to any space x , we have $\dot{t} = \frac{x}{v} = \dot{x} \sqrt{\frac{ma^3}{2gx} \times \{2a^2n - x^2(2a-x)\}^{-\frac{1}{2}}}$, and, by the binomial theorem, $\dot{t} = \frac{1}{2} \sqrt{\frac{m}{ng}} \times \left\{ x^{-\frac{1}{2}} + \frac{(2a-x)x^{\frac{3}{2}}}{2(2a^2n)} + \frac{1.3(2a-x)^2x^{\frac{7}{2}}}{2.4(2a^2n)^2} + \frac{1.3.5(2a-x)^3x^{\frac{11}{2}}}{2.4.6(2a^2n)^3} + \&c. \right\}$, and the fluents give $t = \sqrt{\frac{mx}{ng}} \times \left\{ 1 + \frac{x^2(\frac{2}{3}a - \frac{1}{2}x)}{2(2a^2n)} + \frac{1.3x^4(\frac{4}{9}a^2 - \frac{4}{11}ax + \frac{1}{13}x^2)}{2.4(2a^2n)^2} + \frac{1.3.5x^6(\frac{8}{27}a^3 - \frac{4}{9}a^2x + \frac{6}{11}ax^2 - \frac{1}{13}x^3)}{2.4.6(2a^2n)^3} + \&c. \right\}$; and this, by substituting .845, .155, $16\frac{1}{13}$, 10, and 4.4674472 respectively for m, n, g, a , and x , gives $t = 1''.488$, nearly, the whole time of ascent, as was required.

Other neat solutions were sent to this question.

XVIII.—Question (18), by Mr. GRIFFITH JONES.—Given the centripetal force, as the square of the distance inversely, to find the resistance (to a body moving in medium), so that the body may describe a circle about the centre of force, that centre not coinciding with the centre of the circle.

Answered by Mr. J. BAINES.

Let P be the centre of force, and O the centre of the circle. Take B, any point in the arc, and through P draw BPA perpendicular to the diameter in A. Join OP, OB, and draw BN, NM perpendicular to OB, AB. Put $OP = a$, $OB = r$, $AB = x$, $PB = y$, $BM = dy$, and arc $BN = dx$; then the resistance is to the centripetal force as



$$xd\left(\frac{1}{y^2}\right) + \frac{dx}{y^2} + \frac{2dy}{y^3} : 1, \text{ Simpson's Fluxions (Davis's edit., } \frac{2dx}{y^2}$$

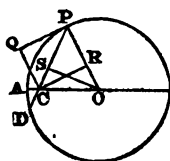
Art. 371); but in the circle $AO = \sqrt{r^2 - x^2}$, $AP = \sqrt{a^2 - r^2 + x^2}$, and $x = y + \sqrt{a^2 - r^2 + x^2}$; therefore $x = \frac{r^2 - a^2 + y^2}{2y}$, and,

by substitution and reduction, the resistance : centripetal force as $\frac{dy}{dz} \cdot \frac{3y^2 - 8(r^2 - a^2)}{4y^3} : 1$; but $\frac{dy}{dz} = \sin. \angle BNM = \sin. \angle$

ABO, which is $= \frac{1}{2ry} \sqrt{2y^2(r^2 + a^2) - y^4 - (r^2 - a^2)^2}$. Hence the law of the resistance is known. When $a = r$, the resistance varies as $\frac{8}{8r} \sqrt{4r^2 - y^2} : 1$.

Again, by Messrs. GILL and RUTHERFORD.

Let O be the centre of the circle, C the centre of force, and CP any radius vector. Produce PC to meet the circle in D; join OP, and draw OS and CR at right angles to DP and PO. Let PQ be a tangent at P, and demit CQ perpendicular thereto. Put $OC = a$, $CP = x$, $AP = s$, $PS = SD = \frac{1}{2}$ chord of curvature $= s$, and let OP be denoted by unity; then $CD = (AO^2 -$



ing BA in N, and EF in D; put $a = AB$, $b = AE$, $x = EN = DP$, $y = NP = DE$, and $z = EI$. Now, by the similarity of the triangles EAI and IPD, we shall have

$$\overline{b^2 + z^2} : x^2 :: a^2 : x^2 \text{ (per question), or } b^2 : x^2 :: a^2 - x^2 : x^2; \text{ hence } z = \frac{bx}{\sqrt{a^2 - x^2}}.$$

Again, we have $ID = \sqrt{a^2 - x^2}$, consequently $y = z + ID = \frac{bx}{\sqrt{a^2 - x^2}} +$

$$\sqrt{a^2 - x^2} = \frac{a^2 + bx - x^2}{\sqrt{a^2 - x^2}}, \text{ the equation of the curve. Assume } A = \text{area, therefore } dA = ydx = \frac{bx dx}{\sqrt{a^2 - x^2}} + dx \sqrt{a^2 - x^2};$$

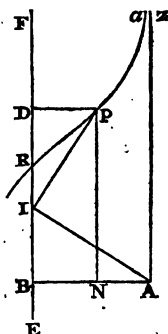
integrating, we have $A = -b\sqrt{a^2 - x^2} + \frac{1}{2}x\sqrt{a^2 - x^2} + \frac{1}{2}a^2 \times \text{arc tang. } \frac{x}{\sqrt{a^2 - x^2}} + c$. But when x is $= 0$, A is $= 0$; therefore $c = ab$; hence the correct area is $= ab - b\sqrt{a^2 - x^2} + \frac{1}{2}x\sqrt{a^2 - x^2} + \frac{1}{2}a^2 \times \text{arc tang. } \frac{x}{\sqrt{a^2 - x^2}}$.

When a and b are equal, the area is $= a^2 - a\sqrt{a^2 - x^2} + \frac{1}{2}x\sqrt{a^2 - x^2} + \frac{1}{2}a^2 \times \text{arc tang. } \frac{x}{\sqrt{a^2 - x^2}}$; this, when x is $= a$, becomes $a^2 + \frac{a^2 \times \pi}{4}$ ($\pi = 3.1416$).

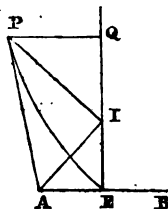
It is evident in this case that the curve has an asymptote, which is a line drawn parallel to EF from the point N.

Again, by Mr. R. MAFFETT.

Let EQ be the indefinite right line perpendicular to the given right line AB; draw AI, on which erect the perpendicular IP $= AB$. Now, as P is a point in the curve, draw AP and PQ parallel QE and AB, then it is evident that the angles in the triangles EAT, IAP, and QIP are identical; therefore, put $AB = a$, $PQ = AE = x$, and $EQ = AP = y$, then $\sqrt{y^2 - a^2} = AI$, and



$\sqrt{(y^2 - a^2 - x^2)} = EI$; therefore, by similar triangles, $\sqrt{(y^2 - a^2)} : \sqrt{y^2 - a^2 - x^2} :: a : x$, from which $y = \sqrt{a^2 - x^2}$, the equation to the curve, when $x = 0$, $y = 0$; therefore the curve begins at E, and when $x = a$, $y = a^2$; hence the quadrature = $\int \frac{a^2 x}{\sqrt{a^2 - x^2}} = a^2 \times .017453 \times \text{deg.}$ in the



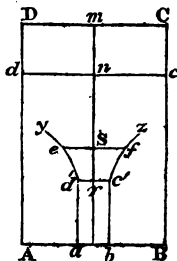
arc whose nat. sin. is $\sqrt{\left(\frac{x^2}{a^2}\right)} = \frac{x}{a}$, radius unity, which, when $x = a$, gives the sine = radius; hence the area is $a^2 \times .017453 \times 90^\circ = 1.57077a^2$. W.W.R.

XX.—PRIZE QUESTION (20), by N. N.—Out of a reservoir irregularly supplied with water, a constant supply is wanted for certain purposes, and it has been found that a rectangular perforation, the breadth of which is b and depth a inches will yield the quantity wanted when the reservoir is full; but this being seldom the case, another aperture, having its base in the same right line with the upper side of the former one is wanted, which is to be entirely closed by a shuttle when the reservoir is full.

Now, suppose the shuttle to be connected to one end of a lever (the arms of which are a and c inches in length), to the other end of which a buoy is fixed which floats in the reservoir, raising or depressing the shuttle as the water in the reservoir falls or rises; what must be the equation of the curve of the upper aperture, so that the same quantity of water may be constantly discharged.

Answered by Mr. G. JONES.

Let ABCD represent a vertical section or the side of the reservoir, DmC the surface of the water at the commencement of motion, dnc the surface when depressed by the deficiency of the supply. Let $abc'd'$ represent the original orifice, $edcs$ the additional aperture, so as to admit the same quantity to escape as when the reservoir is full. Let the vertical mn bisect the horizontal lines ef and $d'e'$ in s and r ; then (per question) $ab = b$, ad' or $bc' = d$, $CB = h$, $mr = k'$, $sr = x$, $ef = y$, $mn = z$, $g = 32\frac{1}{2}$, $t =$



time in which any quantity of water is discharged; then that discharged through the orifice $abc'd'$, when the surface is at m , is =

$$\frac{2}{3}t\sqrt{2gbd} \times (h^{\frac{3}{2}} - h'^{\frac{3}{2}}), \text{ and when depressed down to } n \text{ is } =$$

$t\sqrt{2g} \times \int y dx \sqrt{h-z}$; but $z : x :: a : c$, hence $z = \frac{ax}{c}$; then,

by substitution, we have $t\sqrt{2g} \int y dx \sqrt{h-z} = \frac{2}{3} t \sqrt{2gbd} \times$

✓ $h - \frac{a x^2}{c} + c$. Again, the quantity discharged at the orifice

comes in the time (t) is $= t \sqrt{2gfy} dx \sqrt{h - x - z} =$

$$t \sqrt{2gfy} dx \sqrt{h' - mx} + c' \left(\text{making } m = \frac{c + a}{c} \right). \text{ Put } n = \frac{a}{c},$$

then (per question) we shall have $\frac{1}{2} t \sqrt{2gbd} \times (\sqrt{h - nx^{\frac{3}{2}}} - h^{\frac{3}{2}})$

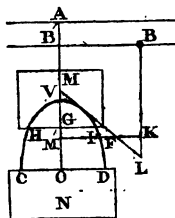
$$+ t \sqrt{2g} \int dx y \times \sqrt{h' - mx^{\frac{1}{2}}} = \frac{2}{3} t \sqrt{2gbd} \times (h^{\frac{3}{2}} - h'^{\frac{3}{2}}); \text{ dif-}$$

differentiating, and dividing by $t\sqrt{bd} \times dx$, we have $n\sqrt{bd}(h-nx)^{\frac{1}{2}}$

$= By(h' - mx)^{\frac{1}{2}}$ (B being some function of the constant quantities). Hence, by reduction, there results $h'B^2y^2 - B^2my^2x + n^2b^2dx - n^2hbd = 0$, which is the equation of the curve.

Again, by Mr. C. GILL.

Let A be the surface of the water when the vessel is full, B'B any other position of it, N the lower aperture (whose area is s), CVD the upper one, M the shuttle (of which the initial position is M'), MFL the lever, the fulcrum of which (F) is constrained to keep in the line KM' \perp VO, and B the buoy, attached to L by the rod BL = AM'. Let AO = h , FL = a , FM = c , $16\frac{1}{2} = g$, AB' = LK = z , OG = MM' = x , and GH = y ; also let Q = quantity of water flowing through N in 1'', in position BB'; and q = ditto through CHGID in 1''. By hydraulics, the quantity of fluid flowing through N, in the time


$$\sqrt{\frac{h-z}{2g}} = (h-z)s, \text{ therefore } Q = s\sqrt{2g(h-z)}. \text{ But } a : c$$

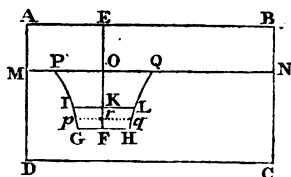
$\therefore z : x$, or $z = \frac{a}{c}x = nx$, and $Q = s\sqrt{2g(h-nx)}$; when $x = 0$, $Q = s\sqrt{2gh}$, its initial value. Again, $B'G = h - z - x = h - \left(1 + \frac{a}{c}\right)x = h - mx$, therefore the quantity of fluid flowing through CHID in the time $\sqrt{\frac{h-mx}{2g}} = (n-mx)\int 2ydx$, or $g = \sqrt{2g(h-mx)}\int 2ydx$. Whence $Q + q = s\sqrt{2g(h-nx)} + \sqrt{2g(h-mx)}\int 2ydx = s\sqrt{2gh}$; therefore $\int 2ydx = s \cdot \frac{\sqrt{h} - \sqrt{h-nx}}{\sqrt{h-mx}}$; and, integrating, and dividing by $2dx$, we get

$$y = \frac{1}{2}s\sqrt{h} \times \frac{m\sqrt{h-nx} - \sqrt{h}}{(h-nx)^{\frac{1}{2}} \cdot (h-mx)^{\frac{3}{2}}}, \text{ the equation of the curve.}$$

When $x = 0$, $y = \frac{(m-1)s}{4h} = \frac{as}{4ch} = co$; and when $x = \frac{(m^2-1)h}{m^2n} = \frac{c(a+2c)}{(a+c)^2}h$, $y = 0$, or $OV = \frac{c(a+2c)}{(a+c)^2}h$.

Again, by Mr. W. RUTHERFORD.

Let ABCD be that part of the reservoir in which the required aperture PGHQ is to be made. Put the depth EF = m , then the depth of the rectangular perforation will be expressed by $m + d$, and supposing the velocity of efflux to be equal to that which a heavy body would acquire in falling through half the altitude, we have the velocity of efflux at the depth $m + d =$



$\sqrt{g(m+d)}$, g being $= 32\frac{1}{2}$ feet; hence the quantity of water discharged per second through an orifice equal to the rectangular perforation, and at the depth $m + d$, is $= bd\sqrt{g(m+d)}$, and (by Hutton's Course, Vol. II, prop. 71, cor. 2) the quantity discharged per second through the rectangular perforation is $= \frac{1}{2}b\sqrt{g} \times \{ (m+d)^{\frac{3}{2}} - m^{\frac{3}{2}} \}$. Suppose now the water has de-

scended to MN, and put $EO = n$; then $OF = m - n$, and the perpendicular descent of the buoy : the perpendicular ascent of the shuttle : $a : c$, the arm of the lever next to the buoy being denoted by a ; hence FK, the depth of the aperture now opened

by the shuttle, is $= \frac{cn}{a}$. Also, the quantity discharged per second through the rectangular perforation is now $= \frac{2}{3}b\sqrt{g} \times \{ (m - n + d)^{\frac{3}{2}} - (m - n)^{\frac{3}{2}} \}$, and therefore the quantity that must be discharged per second through the aperture GHLI is $= \frac{2}{3}b\sqrt{g} \times \{ (m + d)^{\frac{3}{2}} - m^{\frac{3}{2}} - (m - n + d)^{\frac{3}{2}} + (m - n)^{\frac{3}{2}} \}$, the difference between the respective quantities discharged through the rectangular perforation when the reservoir is full, and when the surface has descended to MN. Denote this difference by D, and put prq any section of the aperture GHLI $= 2y$, and $Fr = x$; then the velocity at $r = \sqrt{g(m - n - x)}$, and the fluxion of the quantity discharged through the variable aperture GHqp $= 2y\dot{x}\sqrt{g(m - n - x)}$, whose fluent must be $= D$, when taken between the limits $x = 0$, and $x = FK = \frac{cn}{a}$. Suppose now that

$y = \frac{A}{\sqrt{g(m - n - x)}}$, where A is a constant quantity to be determined; then the expression $2y\dot{x}\sqrt{g(m - n - x)}$ becomes $2A\dot{x}$, the fluent of which is $2Ax$, vanishing when $x = 0$, as it ought, and

when $x = \frac{cn}{a}$, it is $\frac{2Acn}{a}$; therefore, since $\frac{2Acn}{a} = D$, we get

$A = \frac{aD}{2cn}$, and $y = \frac{aD}{2cn\sqrt{g(m - n - x)}}$, the equation of the upper aperture, as required.

We regret we have not room to insert the other elegant solutions sent to this question.

A LIST

OF THE

MATHEMATICAL CONTRIBUTORS,

And the Questions answered by each.

ABBATT	1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 14, 15, 17, 18, 19
ANDREW	All the Questions
BAINES	{ 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 17, 18, 19
CLAY	1, 2, 3, 4, 5, 6, 7, 10, 13, 14, 18, 19
CLOUGH	1, 3, 4, 5, 6, 15
DAWSON	1, 3, 4, 5, 6, 7, 10, 12, 15
DUCKET	2, 3, 4, 5, 6, 7, 15, 17, 18, Prize
GILL	All the Questions
GODWARD	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 17, 18, 19
HARDCASTLE..	1, 2, 3, 6, 7
JONES	1, 2, 3, 4, 5, 6, 7, 11, 12, 13, 14, 15, 16, 17, 18, 19, Pr.
MAFFETT	1, 2, 3, 4, 5, 7, 8, 9, 10, 12, 13, 14, 15, 17, 19
MIDDLEMISS ..	1, 4, 5, 6
M. M.	16
KNIVETON ..	} 1, 2, 3, 4, 5, 6, 10, 15
OAKES	
RUTHERFORD..	All the Questions
SHERIDAN	1, 2, 3, 4, 5, 6, 9, 12, 15, 19
TODD	4, 8

NEW MATHEMATICAL QUESTIONS.



Question (1), by Mr. RICHARD ABBATT, *Eagle House, Brook Green, Hammersmith.*

From two given points in the circumference of a given circle, to inflect two straight lines to a point in the opposite circumference cutting a given chord, so that the rectangle of the extreme segments may be equal to a given space, or a maximum.

Question (2), by Mr. JOHN BAINES, *Parbold Hall, Wigan.*

Find such values of x , y , and z , as will render $xy + z^2 + x$, $xz + y^2 + y$, $yz + x^2 + x$, and $xy + yz + xz$ squares, excluding unity as the value of any one of the three letters.

Question (3), by the same.

If a hole were bored through the earth, parallel to the equator, in lat. 20° , and a heavy body let fall into it from the surface, it is required to determine its velocity at any point of its descent, taking into account the variation of gravity, but abstracting all resistance.

Question (4), by Mr. PATRICK O'CALLAGHAN, *Limerick, Ireland.*

If innumerable right lines be drawn so as to cut off equal areas from a given parabola, what is the nature of the curve to which these lines are tangents?

Question (5), by Mr. JOHN CAM, *Torpenhow.*

A glass tube one inch in diameter, and a quarter of an inch thick, is forty inches long; now if ten inches of the tube from the bottom be filled with mercury, and ten more with water, and the tube be suspended at the other end and be made to vibrate, required the time of oscillation.

Question (6), by Mr. H. CLAY.

A gentleman dying left to his eight sons and daughters an elliptical field containing 100 acres, having its axes in the ratio of

NEW QUESTIONS.

3 to 2. The portions of the four sons to be determined by describing the greatest possible circle in each quadrant of the ellipse; the open space at each end of the transverse belonging to the two eldest daughters, and those at the extremities of the conjugate to the two youngest: the space about the centre bounded by the four circles was to reward the ingenuity of the person who should correctly determine the quantity of land in the share of each.

Question (7), by Mr. J. B. CHIVERS, St. Austle, Cornwall.

In a gentleman's cellar stands inverted a conical piece of wood whose base is 110 inches, out of which he intends to excavate a cylinder the vacuity of which is to contain 80,211 $\frac{1}{2}$ ale gallons (old measure): now, to prevent leakage, it is found necessary to approach no nearer than within one foot of the vertex of the cone, whose least thickness of wood is two inches when the base and axis of the cylinder are in those of the cone. Required the dimensions of the cylinder, and height of the cone.

Question (8), by the Reverend W. GARROW.

Determine expressions for three numbers such that the sum of every two of them may be an n th power, and the sum of all three an $(n + 1)$ th power; and give an example in affirmative integral numbers for each of the cases $n = 2$ and $n = 3$.

Question (9), by Mr. C. GILL, Seamer, near Scarborough.

A circle being given in magnitude, and a point in position, two straight lines may be found (parallel to each other), such that if any right line be drawn from the point and intersecting the lines to be found, the square of the segment of that line intercepted by the parallel lines shall be equal to half the sum of the squares of the tangents drawn from the intersecting points in the lines to the circle.

Question (10), by Mr. WILLIAM GODWARD.

Given the distance of the centres of the inscribed and circumscribing circles, and the difference of the angles at the base, to determine the plane triangle by geometrical construction, when the distance of the centre of the inscribed circle and the vertex is either given or a maximum.

Question (11), by Mr. WILLIAM HARDCASTLE, Jun.

Three bodies, A, B, C, weighing respectively A, B, and C pounds, have their common centres of gravity joined by the lines AB, BC, CA; of which $AB = c$ feet, $BC = a$, and $CA = b$.

NEW QUESTIONS.

What are the distances of A, B, C from their common centre of gravity?

Question (12), by Mr. GRIFFITH JONES, Liverpool.

Integrate the following differential equation, viz.

$$\left(\frac{\sec. \theta. - \tan. \theta.}{\sec. \theta. + \tan. \theta.} \right) \text{ radius.}$$

Question (13), by the same.

AB is an upright post fixed firmly in the ground at A; AC a beam which is kept in that position by a rope attached to AB at B, and to AC at C; to the point C a given weight (W) is appended. Required the effect of the forces acting on the several parts of the machine in different directions.

Question (14), by Mr. WILLIAM RUTHERFORD.

It is required to ascertain the centre of gravity of the frustum of a right cone, by means of the position of the centre of gravity of a complete cone.

Question (15), by the same.

Required the position of the centre of gravity of a right cone from which the greatest inscribed cylinder has been excavated.

Question (16), by Mr. D. T. SHERIDAN, Colton Hall, near Lichfield.

A hollow triangular pyramid, of uniform thickness, made of a cubical foot of lead, is vertically inverted in water; find the ratio of its dimensions, when the immersed surface is a minimum.

Question (17), by Mr. W. STRINGER.

ACB is any right angled triangle whose leg AB is given; upon AC take AP always a mean proportional to AC and BC, and P will be found in a curve, the quadrature of which is required.

Question (18), by the late Mr. THOMAS WILKINSON, of Castle Sowerby, Cumberland.

Given the difference of each side and its adjacent segment of the base made by the perpendicular, and the difference between the perpendicular and diameter of the inscribed circle, to construct the triangle.

* * We were favored with this question by Mr. Thomas Todd, of Liverpool, who assures us it has not been published before.

NEW QUESTIONS.

Question (19), by Mr. WILLIAM WRIGHT, Hall.

If a number A be the sum of two squares whose difference is a square, or the difference of two squares whose sum is a square, prove that A is the area of a rational right angled triangle. If A represent twice the sum of two squares whereof twice their difference is a square, or twice the difference of two squares whereof twice their sum is a square, prove that A is in either case the area of a rational right angled triangle.

PRIZE QUESTION (20), by the same.

Find a trapezium, such that the sides, area, diagonals, and diameter of the circumscribing circle, shall be whole numbers, and the perimeter a rational square.

. We regret our inability to insert, in this Number of our Work, a valuable Geometrical Paper which we have just received from Mr. JAMES CUNLIFFE; in fact, the Printers had so far proceeded with the present Number, that we could not acknowledge the receipt of his communication in any other part of it than here, at the end of the New Questions.

THE MATHEMATICAL ASSOCIATE.

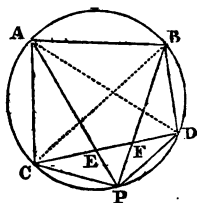
ANSWERS TO THE QUESTIONS

PROPOSED LAST YEAR.

I.—QUESTION (21), by Mr. RICHARD ABBATT.—From two given points in the circumference of a given circle, to inflect two straight lines to a point in the opposite circumference cutting a given chord, so that the rectangle of the extreme segments may be equal to a given space, or a maximum.

*Answered by Mr. CHARLES HOLT, and Mr. WILLIAM LOMAX,
Astley Bridge, near Bolton-le-Moor.*

Analysis.—Let AB be the two given points, P the point in the opposite circumference; from A and B draw AP and BP, cutting the given chord CD in E and F; then will the rectangle $CE \times FD$ equal the given space. The triangles CFB and PFD are similar; therefore $PD : FD :: CB : FB$; but the triangle AED is similar to the triangle CEP; hence, as $CP : CE :: AD : EA$, by compounding the terms $CB \times AD : FB \times EA :: PD \times CP : FD \times CE$. Again, the triangles CFP and DFB are similar, and also the triangle CEA to the triangle PED; therefore $BD : BF :: CP : CF$, and $AC : AE :: DP : DE$. By compounding these last proportions we have $BD \times AC : BF \times AE :: CP \times DP : CF \times DE$; but the means of these two rectangular proportions are identical; therefore, as $BD \times AC : CB \times AD :: FD \times CE : CF \times DE$, and, by division, $BD \times AC : CB \times AD - BD \times AC :: FD \times CE : CF \times DE - FD \times CE = (CE + EF + FD) \times EF = CD \times EF$; but the first two terms of this proportion are given, and the third is given or a maximum; hence the last, or $CD \times EF$, is given or a maximum;

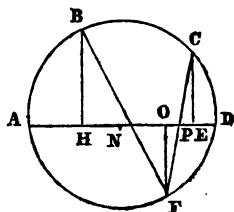


CD is likewise given, therefore EF is given or a maximum; and the problem is reduced to "From two given points A, B, in the circumference of a given circle, to draw two chords to intersect each other in the opposite circumference at P, and to intercept on a given chord CD a segment EF, that shall be given or a maximum;" which has been considered in question 524, *Mathematical Companion*, No. 24.

Similar to the above was Mr. Thomas Thompson's, Newcastle-upon-Tyne.

Again, by Mr. THOMAS HOGAN, 48, Wells Street, Oxford Street, London.

Let ABC be the given circle, B and C the given points, AD the given chord, F the point required. Join BF, CF, and drop the perpendiculars BH, FO, and CE, on AD. Let BH = a, CE = b, AH = d, HE = g, DH = r, DE = c, and HN = x; then BN = $\sqrt{a^2 + x^2}$, FN =



$$\frac{AN \times DN}{BN} = \frac{(d+x) \cdot (r-x)}{\sqrt{a^2 + x^2}}, FO =$$

$$\frac{FN \times BH}{BN} = \frac{a(d+x)(r-x)}{a^2 + x^2}, NO =$$

$$\frac{FO \times HN}{BH} = \frac{x(d+x)(r-x)}{a^2 + x^2}. \text{ Again, by similar triangles, we}$$

$$\text{get } PE = \frac{CE \times EO}{CE + FO} = (\text{because } EO = EH - HN - NO)$$

$$\frac{\left(g - x - \frac{x(d+x)(r-x)}{a^2 + x^2}\right)b}{b + \frac{a(d+x)(r-x)}{a^2 + x^2}} = (\text{by reduction})$$

$$\frac{((g-x)(a^2 + x^2) - (dx + x^2)(r-x))b}{a^2b + bx^2 + a(d+x)(r-x)}.$$
 Hence, per question,

$$\left(\frac{((g-x)(a^2 + x^2) - (dx + x^2)(r-x))b}{a^2b + bx^2 + a(d+x)(r-x)} + c\right)(d+x) =$$

a maximum. This expression, differentiated and reduced, and equated equal to nothing, we find the value of x ; and consequently the point F is determined.

II.—Question (22), by Mr. JOHN BAINES.—Find such values of x , y , and z , as will render $xy + z^2 + z$, $xz + y^2 + y$, $yz + x^2 + x$, and $xy + yz + xz$ squares, excluding unity as the value of any one of the three letters.

Answered by Mr. WILLIAM HARRISON, Ogle; Mr. MORPETH; and Mr. ANDREW MIDDLEMISS, of Rawdon, near Berwick-on-Tweed.

Assume $z = 0$, then the formulæ become xy , $y^2 + y$, and $x^2 + x$, to be made squares. Put $y^2 + y = (y - m)^2 = y^2 - 2my + m^2$; then $y = \frac{m^2}{2m + 1}$. Let $m = 1$, then $y = \frac{1}{3}$. This, substituted in the first formula, gives $\frac{x}{3} = \square = n^2$, or $x = 3n^2$; which, substituted in the third formula, gives $x^2 + x = 9n^4 + 3n^2 = \square = (3n^2 - p)^2 = 9n^4 - 6pn^2 + p^2$; therefore $n = \frac{p}{\sqrt{6p + 3}}$. Take $p = 1$, then $n = \frac{1}{3}$, and $x = 3n^2 = \frac{1}{3}$; which answer the conditions.

Again, by Mr. ROBERT MAFFETT, of Plymouth; Mr. SAMUEL KNIVETON, of Wirksworth; and Mr. WM. OAKES, of Harlow.

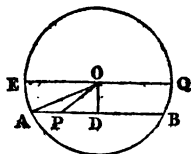
Put $z = \frac{1}{n}$, $y = \frac{4}{n}$, and $x = \frac{9}{n}$: these values being substituted in the question, gives, after reduction, $37 + n = \square$, $\frac{25}{4} + n = \square$, $\frac{85}{9} + n = \square$, and $\frac{40}{n^2}$ a square. For n in the first expression above put $r^2 - 37$, then $n = r^2$, which being written in the other two expressions, gives $r^2 - \frac{123}{4} = \square$, and $r^2 - \frac{248}{9} = \square$. Make $r^2 - \frac{123}{4} = r^2 - 2rv + v^2$, from which $r = \frac{4v^2 + 123}{8v}$. Put this value of r in the expression to be made a square, and it gives, after being reduced, $144v^4 - 7016v^2 + 136161$, which is a square when $v = 3$. Hence $r = \frac{53}{8}$, and $n = \frac{441}{64}$, consequently $z = \frac{64}{441}$, $y = \frac{256}{441}$, and $x = \frac{576}{441}$; which numbers will solve the question, and, further, are all square numbers.

The other solutions were similar.

III.—Question (23), by Mr. JOHN BAINES.—If a hole were bored through the earth, parallel to the equator, in lat. 20° , and a heavy body let fall into it from the surface, it is required to determine its velocity at any point of its descent, taking into account the variation of gravity, but abstracting all resistance.

Answered by Mr. WM. RUTHERFORD, Hamick, Roxburghshire.

Let O be the centre of the earth, AB a hole through it parallel to EQ the equator, and at the given distance; demit OD at right angles to AB , and draw OP to any point P in AB . Put $OE = R$, $AD = DB = a$, $PD = x$, and $32\frac{1}{2}$ feet $= g$; then the accelerative force of gravity within the earth being as the distance from O , the force on P in direc-



tion $PO = g \cdot \frac{OP}{AO}$, the resolvent of which, in direction PD , =

$g \cdot \frac{PD}{AO} = \frac{gx}{R}$; consequently $v dv = -\frac{gxdx}{R}$, where v denotes the

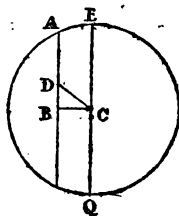
velocity at P ; and, by integration, $v^2 = \text{const.} - \frac{gx^2}{R} = \frac{g}{R}(a^2 - x^2)$;

hence $v = \sqrt{\frac{g}{R} \cdot \sqrt{a^2 - x^2}}$. Now $AD = R \sin. 70^\circ$, and there-

fore $v = \sqrt{\frac{g(R^2 \sin.^2 70^\circ - x^2)}{R}}$, which gives the velocity of the body at any point of its descent. Thus, for example, if $x = \frac{1}{2}a = \frac{1}{2}R \sin. 70^\circ$, then $v = \frac{1}{2} \sin. 70^\circ \sqrt{3gR} = \frac{1}{2} \sin. 70^\circ \sqrt{3g \times 21040800} = 21171$ feet.

Again, by Mr. N. J. ANDREW, Penzance; and Mr. GEORGE DUCKETT, of Liverpool.

In the annexed diagram let AE be 20° , D the place of the body at the end of any time t , v its corresponding velocity; and put $AD = x$, $AB = a$, $BC = b$, the earth's radius = r , and $32\frac{1}{2} = g$. Now $DC = \sqrt{\{(a-x)^2 + b^2\}}$; and from the laws of gravity, $r : g :: \sqrt{\{(a-x)^2 + b^2\}} : \frac{g}{r} \sqrt{\{(a-x)^2 + b^2\}}$ = the force accelerating the body in the direction DB . Again, from the decomposition of forces,



DC : DB :: $\frac{g}{r} \sqrt{(a-x)^2 + b^2}$: $\frac{g}{r} (a-x)$ = force accelerating the body in the direction DB. Hence, by dynamics, $\frac{g}{r} (a\dot{x} - x\dot{x}) = v\dot{v}$; taking the fluents, &c. $v = \sqrt{\frac{g}{r} (2ax - x^2)}$. Now, when $x = a$, the greatest value of $v = a \sqrt{\frac{g}{r}}$. If it were required to find the time, we should have $t = \sqrt{\frac{r}{g}} \int \frac{\dot{x}}{\sqrt{(2ax - x^2)}}$
 $= \frac{\sqrt{r}}{a\sqrt{g}} \times \text{circular arc to rad. } a \text{ and versed sine } x.$

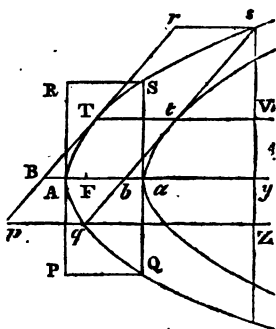
Would our limits allow, we should have been glad to insert the good solutions sent by Mr. W. J. Carr, Alwrick, Northumberland; and Mr. David Roberts, of Stonehouse.

IV—Question (24), by Mr. PATRICK O'CALLAGHAN.—If innumerable right lines be drawn so as to cut off equal areas from a given parabola, what is the nature of the curve to which these lines are tangents?

Answered by Mr. WILLIAM WRIGHT, of Hull.

Let $QqATS$ be a parabola, A its vertex, F the focus, Ay the axis; draw the double ordinate SQ cutting Ay at a , and making the space $QASQ = \text{given one}$; then a parabola to vertex a , axis ay , and equal to the given one, is the curve sought.

Demonstration.—At any point t in the inner parabola draw a tangent, meeting Ay at b , and the external parabola at q, s ; through t draw the diameter HtV meeting the given parabola at T , at which point draw an indefinite tangent cutting Ay at B , and rs, pq parallel to AB at r, p , draw $sV \perp Tt$; then, by *Emerson's Conics*, $sV^2 = 4AF \times Tt$, likewise $aS^2 = 4AF \times Aa$; but, by reason of the parabolas being similar and equal figures $ab = AB$, to each of these add Ab , then $Aa = Bb = Tt$ (by parallels); ergo, $4AF \times Tt = 4AF \times Aa$, consequently $sV = aS$, and prolonging sV to meet pq produced



$\frac{x-b}{y}$, or $y^2 = a(x-b)$, or the curve is a parabola, having the same parameter, and has its vertex B at distance $\sqrt[3]{\frac{9a^4}{16a}}$ from it.

Had the neat solutions sent us by Mr. Richard Abbott and Mr. Thomas Thompson been essentially different from Mr. Gill's, we would have endeavoured to insert them.

V.—Question (25), by Mr. JOHN CAM.—A glass tube one inch in diameter, and a quarter of an inch thick, is forty inches long; now if ten inches of the tube from the bottom be filled with mercury, and ten more with water, and the tube be suspended at the other end and be made to vibrate, required the time of oscillation.

Answered by Mr. JOHN BAINES, Master of Thornhill Grammar School, near Wakefield.

If we take the specific gravities of glass, water, and mercury 2600, 1000, and 14000, the weight of the empty, aqueous, and mercurial parts of the tube (including the glass) will be as $20(1.5^2 - 1^2) \times 2600$, $10.1\frac{1}{4}.2600 + 10.1.1000$, and $10.1\frac{1}{4}.2600 + 10.1.14000$, or as 26, 17, and 69, which call a , b , and c . Also, the distances of the centres of gravity of the said three parts from the point of suspension are 10, 25, and 35 inches, which call m , n , and o ; and the common centre of gravity of the whole system from the said point = $\frac{26.10 + 17.25 + 69.35}{26 + 17 + 69} = \frac{775}{28}$, which call e . Now, by

means of the formula $\frac{\int dx \{ (l+x)^2 y^2 + \frac{1}{2} y^4 \}}{\int dx (l+x) y^2}$ we easily obtain

the centre of oscillation of each part respectively. In each part y^2 , though different in value, is constant, which circumstance reduces the formula to $\frac{\int dx \{ (l+x)^2 + \frac{1}{2} y^2 \}}{\int dx (l+x)}$. In the uppermost

part $y^2 = 1\frac{1}{4}$, and $l = 0$; hence $\frac{\int dx (x^2 + \frac{5}{16})}{\int dx x} = \frac{16x^3 + 15}{24} = \frac{1263}{96}$,

when $x = 20$. In the second part, after reducing the space to the

same density as glass, $y^2 = 1\frac{1}{2} + \frac{5}{13} = \frac{65}{52}$, and $l = 20$; hence

$$\frac{\int dx \{ (20 + x)^2 + \frac{5}{13}x \}}{\int dx(20 + x)} = \frac{249655 + 12460x + 208x^2}{12480 + 312x} = \frac{79091}{3120},$$

when $x = 10$. In the lowermost part, when the mercorial space is reduced to the density of glass, $y^2 = 1\frac{1}{2} + \frac{70}{13} = \frac{345}{52}$, and $l = 30$;

$$\text{hence } \frac{\int dx \{ (30 + x)^2 + \frac{345}{52}x \}}{\int dx(30 + x)} = \frac{562635 + 18720x + 208x^2}{18720 + 312x} =$$

$$\frac{154127}{4368}, \text{ when } x = 10. \text{ Putting the distances of the centres of}$$

oscillation of the three parts respectively from the centre of suspension now found, viz. $\frac{1283}{96}$, $\frac{79091}{3120}$, and $\frac{154127}{4368} = p, q,$ and $r,$

we have, by *Marrat's Mechanics*, art. 688, $\frac{amp + bq + cr}{c(a + b + c)} =$

$$\frac{3103241}{96720} = 32\frac{8201}{96720} \text{ inches} = \text{the distance of the common centre of oscillation from the point of suspension. Hence } (140850 \times \frac{96720}{3103241})^{\frac{1}{2}} = 66.25655 = \text{number of vibrations per minute, or one vibration in } .90557 \text{ of a second.}$$

Nearly the same result was obtained by Mr. C. Gill and Mr. W. Rutherford.

Again, by Mr. RICHARD ABBATT.

Suppose the length of the tube = a , the weights of one inch of the tube, and of the mercury, and water within the tube = $g, m,$ and n ; also, let x vary between 0 and a , and z between $\frac{1}{2}a$ and $\frac{3}{4}a$; then $gdx, mdx,$ are the weights of dx of the glass and mercury, and $n dz$ of dz of the water. Now $\int gx^2 dx$ when $x = a = \frac{1}{3}a^3$;

$$\text{and } \int mx^2 dx, \text{ between the limits of } x = \frac{3}{4}a \text{ and } x = a, = \frac{37m}{192}a^3;$$

$$\text{also } \int nx^2 dz, \text{ between the limits of } z = \frac{1}{2}a \text{ and } z = \frac{3}{4}a, = \frac{19n}{192}a^3.$$

$$\text{Hence the sum of the integrals} = \left(\frac{1}{3}g + \frac{37m + 19n}{192} \right) a^3.$$

Again, $\int g x dx$, when $x = a$, $= \frac{g}{2} a^2$, and $\int m x dx$ (between $x = \frac{1}{2}a$ and $x = a$) $= \frac{7m}{32} a^2$; also, $\int w x dx$ (between $x = \frac{1}{2}a$ and $x = \frac{3}{4}a$) $= \frac{5w}{32} a^2$; and the sum $= \left(\frac{1}{2}g + \frac{7m + 5w}{32} \right) a^2$; hence the length of the pendulum $= \frac{\frac{1}{2}g + \frac{37m + 19w}{192}}{\frac{1}{2}g + \frac{7m + 5w}{32}} a$.

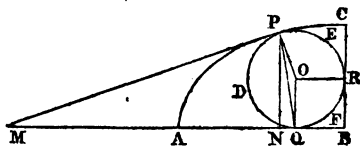
Now, the specific gravity of water, white glass, and mercury, being as 1, 2.892, and 13.568, by calculation, w, g, m are found to be as the numbers .11868, .98584, and 1.54171 respectively; hence, by substitution, and restoring the value of a , we get the length of the pendulum $= 30.04$ inches; and it will vibrate $60 \sqrt{\frac{39.2}{30.04}} = 68.5$ times in a minute; consequently, the time of oscillation $= \frac{1}{2}$ of a second, nearly, as was to be found.

Nearly the same result was obtained by Mr. D. Roberts, Mr. R. P. Oyns, and Mr. W. J. Cole.

VI.—Question (26), by Mr. H. CLAY.—A gentleman dying, left to his eight sons and daughters an elliptical field containing 100 acres, having its axes in the ratio of 3 to 2. The portions of the four sons to be determined by describing the greatest possible circle in each quadrant of the ellipse; the open space at each end of the transverse belonging to the two eldest daughters, and those at the extremities of the conjugate to the two youngest: the space about the centre bounded by the four circles was to reward the ingenuity of the person who should correctly determine the quantity of land in the share of each.

Answered by Mr. WILLIAM RUTHERFORD, and Mr. WILLIAM MITCHELL, *St. Levan Penwith, Cornwall.*

Let ABC be a quadrant of the given ellipse, O the centre of the inscribed circle touching AB in Q, BC in R, and the arc AC in P; PN an ordinate, and PM a tangent at the point P. Join PQ, and let $AB = 3a$, $BC = 2a$, the given area



similar triangles, $CT : TQ :: TP : TM = \frac{a^2 - x^2}{ax} \sqrt{\frac{a^4 + (b^2 - a^2)x^2}{a^2 - x^2}}$
 \equiv (by the nature of tangents) TN ; therefore $QM = QR = QT$
 $MT = \frac{x}{a} \sqrt{\frac{a^4 + (b^2 - a^2)x^2}{a^2 - x^2}}$. Now $CR = CQ - QR =$
 $\frac{ab}{\sqrt{a^2 - x^2}} - \frac{x}{a} \sqrt{\frac{a^4 + (b^2 - a^2)x^2}{a^2 - x^2}}$, and $CN = CT - TN =$
 $\frac{a^2}{x} - \frac{a^2 - x^2}{ax} \sqrt{\frac{a^4 + (b^2 - a^2)x^2}{a^2 - x^2}}$; but $CN = CR$, therefore by
 equating these values of CN , CR , and a little reduction, we obtain
 $ab = \frac{a^2}{x} \sqrt{a^2 - x^2} - \frac{a^2 - 2x^2}{ax} \sqrt{a^4 + (b^2 - a^2)x^2}$. Thus far we

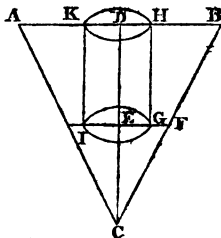
have proceeded generally for any values of the diameters; but, to render this equation less complex and more manageable, we shall substitute for b its value $\frac{3}{2}a$, which will give $2a^2x = 3a^2\sqrt{a^2 - x^2} - (3a^2 - 6x^2)\sqrt{a^2 - \frac{1}{2}x^2}$; this, by squaring twice, and ordering, becomes $25x^{10} - 140a^2x^6 + 296a^4x^5 - 252a^6x^4 + 90a^8x^3 = 9a^{10}$. Substituting a^2v for x^2 , we obtain, after dividing by a^{10} , $25v^5 - 140v^4 + 296v^3 - 252v^2 + 90v = 9$. From this equation v is readily found $= .1589411288$. By the question, $\frac{3}{2}a^2 \times .7854 = 10000000$, whence $a = 21.8509$ chains; therefore $x = av^{\frac{1}{2}} = 8.71138$ chains, which gives the radius of the circle $= 6.81656$, and its area 145.97598 . Now, area $RCN = \text{rad.}^2 - \text{quad.} = 9.9715$; also area $NPLGMB = \text{ellip. seg. MPB} - \text{circ. seg. LVMG} + \text{SVNP} - \text{SVNL} =$ (by the common rules of mensuration) $126.54279 - 47.492423 + 12.916154 - 12.747783 = 79.21914$; and area $MER = \text{ellip. quad.} - \text{RCN} = \text{circ. RMN} - \text{NPLGMB} = 14.83338$. Hence the share of each of the sons is 145.97598 chains $= 14 \text{ a. } 2 \text{ r. } 15 \frac{1}{2} \text{ p.}$; that of the two eldest daughters, $79.21914 \times 2 = 158.43828$ chains $= 15 \text{ a. } 3 \text{ r. } 15 \text{ p.}$ each; that of the two youngest, $14.83338 \times 2 = 29.66676$ chains $= 2 \text{ a. } 3 \text{ r. } 34 \frac{1}{2} \text{ p.}$ each; and the divider's reward $= 9.9715 \times 4 = 39.886$ chains $= 3 \text{ a. } 3 \text{ r. } 88 \text{ p.}$, no inconsiderable recompense for his ingenuity.

Good and correct solutions, similar to one or other of the above, were received from Mr. Robert Middlemist, Mr. Thomas Hogan, and Mr. C. Gill.

VII.—Question (27), by Mr. J. B. CHIVERS.—In a gentleman's cellar stands inverted a conical piece of wood whose base is 120 inches, out of which he intends to excavate a cylinder the vacuity of which is to contain 80.21167 ale gallons (old measure). Now, to prevent leakage, it is found necessary to approach no nearer than within one foot of the vertex of the cone, whose least thickness of wood is two inches when the base and axis of the cylinder are in those of the cone. Required the dimensions of the cylinder, and height of the cone.

Answered by Master JAMES YOUNG and Master EDMUND BATES, of Mr. W. Harrison's School, Ogle Barony, Northumberland.

Let ABC be a section of the cone, and KIGH be a section of the cylinder. Put $EG = x$, then $EF = x + 2$, and by similar triangles, $EF : EC :: DB : DC$, or as $x + 2 : 12$



$:: 55 : DC = \frac{660}{x + 2}$; then $DE =$

$\frac{660}{x + 2} - 12 = \frac{636 - 12x}{x + 2}$, and the

solidity of the cylinder $= .7854 \times$

$4x^2 \times \frac{636 - 12x}{x + 2} = 80.21167$ ale

gallons $= 22619.69094$ in., or $53x^2 - x^3 = 600x + 1200$, or $x^3 - 53x^2 + 600x + 1200 = 0$, from which x is $= 20$ in. the radius of the cylinder's base, $DE = 18$ in. its height, and $DC = 30$ in. the height of the cone.

Similar to this were the other numerous solutions sent us.

VIII.—Question (28), by the Reverend W. GARNOW.—Determine expressions for three numbers such that the sum of every two of them may be an n^{th} power, and the sum of all three an $(n + 1)^{\text{th}}$ power; and give an example in affirmative integral numbers for each of the cases $n = 2$ and $n = 3$.

Answered by Mr. W. J. COLB, Teacher of the Mathematics, &c. Morice Town, near Devonport; and Mr. R. P. OYNS, Royal Engineer Department, Devonport.

The conditions in this question to be fulfilled are the following; $x + y = \phi^n$, $x + z = \phi'^n$, $y + z = \phi''^n$, and $x + y + z = \phi^{n+1}$; which will evidently obtain if we can make $\phi^n + \phi'^n + \phi''^n = 2\phi^{n+1}$; in order to which, assume $\phi = m\phi''$, $\phi' = m'\phi''$, and $\phi'' = m''\phi''$, and we shall have $m^n\phi^{n+1} + m'^n\phi^{n+1} + m''^n\phi^{n+1} = 2\phi^{n+1}$, or $m^n +$

$$\begin{aligned}
 m^n + m'^n &= 2\phi^n, \text{ and therefore } \phi = \frac{m^n + m'^n + m''^n}{2}: \text{ hence, } x = \\
 &\left(\frac{m^n + m'^n + m''^n}{2}\right)^{n+1} - \left(\frac{m''(m^n + m'^n + m''^n)}{2}\right) = \\
 &\left(\frac{m^n + m'^n - m''^n}{2}\right) \cdot \left(\frac{m^n + m'^n + m''^n}{2}\right)^n, \quad y = \left(\frac{m^n + m'^n + m''^n}{2}\right)^{n+1} - \\
 &\left(\frac{m'(m^n + m'^n + m''^n)}{2}\right)^n = \left(\frac{m^n + m'^n - m^n}{2}\right) \cdot \left(\frac{m^n + m'^n + m''^n}{2}\right)^n, \\
 \text{and } z &= \left(\frac{m^n + m'^n + m''^n}{2}\right)^{n+1} - \left(\frac{m(m^n + m'^n + m''^n)}{2}\right)^n = \\
 &\left(\frac{m''^n + m^n - m'^n}{2}\right) \cdot \left(\frac{m^n + m'^n + m''^n}{2}\right); \text{ where, that these}
 \end{aligned}$$

values may be affirmative and integral numbers, the sum of the n th powers of any two must be greater than that of the third, and the sum of the n th powers of all three an *even* number. By attending to these restrictions in the particular cases of $n=2$ and $n=3$, we have, by assuming $m=5$, $m'=6$, and $m''=7$, in the former $x=18150$, $y=57475$, and $z=90750$; and, in the other case, taking $m=7$, $m'=8$, and $m''=9$, we obtain $x=31297964544$, $y=139102064640$, and $z=223060096512$; which numbers will be found to answer the conditions of the question.

Again, by Mr. WILLIAM FINLAY, of Longhaughton, and Mr. N. J. ANDREW.

Let a , b , and c represent the required numbers, and assume $a+b=m^n x^n \dots$ (A), $a+c=p^n x^n \dots$ (B), $b+c=r^n x^n \dots$ (C), and $a+b^2+c=x^{n+1} \dots$ (D). Now, by comparing A + B + C with D, it appears that $x = \frac{1}{2}(m^n + p^n + r^n)$: again, by respectively subtracting the equations A, B, C, from the equation D, there results $a = (x - m^n)x^n$, $b = (x - p^n)x^n$, and $c = (x - r^n)x^n$, where m , p , and r may be any numbers at pleasure. Now first, when $n=2$, take $m=5$, $p=6$, $r=7$, then $x=55$; and the three numbers are, 30×55^2 , 19×55^2 , and 6×55^2 . Again, when $n=3$, take $m=7$, $p=8$, $r=9$, then $x=792$, and the numbers are, 449×792^3 , 280×792^3 , and 63×792^3 ; which sets of numbers manifestly answer the conditions of the question.

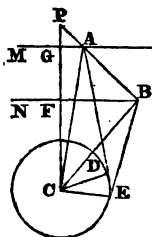
It may be remarked, that if m and p be each less than r , in order to have affirmative numbers, $m^n + p^n$ must be greater than r^n . Q.E.I.

Although the good solutions sent us by Mr. Thomas Pringle, Mr. Jesse Danson, and Mr. W. Clough, merit insertion, they are not essentially different from one or other of the above.

IX.—Question (29), by Mr. C. GILL.—A circle being given in magnitude, and a point in position, two straight lines may be found (parallel to each other), such that if any right line be drawn from the point and intersecting the lines to be found, the square of the segment of that line intercepted by the parallel lines shall be equal to half the sum of the squares of the tangents drawn from the intersecting points in the lines to the circle.

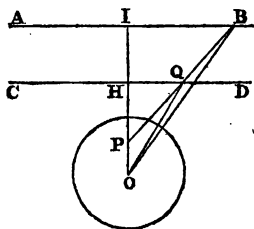
Answered by Mr. JOHN BAINES.

Let C be the centre of the given circle, and P the given point; also MA, NB perpendicular to PC. Draw any line PAB cutting the required lines in A and B; then the other lines being drawn as in the question, and CE, CD, CA, CB joined, put $CP = a$, $CE = CD = r$, $CG = x$, $CF = y$, and $\angle APG = \theta$; from hence we have $AG = (a - x) \tan \theta$, $FB = (a - y) \tan \theta$, and $AB = (x - y) \sec \theta$. Moreover $AD^2 = AG^2 + CG^2 - CD^2 = (a - x)^2 \tan^2 \theta + x^2 - r^2$, and $BE^2 = FB^2 + FC^2 - CE^2 = (a - y)^2 \tan^2 \theta + y^2 - r^2$; hence, by the question, $\{(a - x)^2 + (a - y)^2\} \tan^2 \theta + x^2 + y^2 - 2r^2 = 2(x - y)^2 \sec^2 \theta = 2(x - y)^2 \cdot (1 + \tan^2 \theta)$, or $\tan^2 \theta \times \{(a - x)^2 + (a - y)^2 - 2(x - y)^2\} + x^2 + y^2 - 2r^2 - 2(x - y)^2 = 0$. In this equation the coefficients of $\tan^2 \theta$ must destroy each other, to be general for all values of θ ; hence $(a - x)^2 + (a - y)^2 - 2(x - y)^2 = 0$, which gives $x - 2y = a(\sqrt{3} - 1) - y\sqrt{3}$; but $x^2 + y^2 - 2r^2 - 2(x - y)^2 = 0$, which gives $x - 2y = \sqrt{(3y^2 - 2r^2)}$. Equating these two values of $x - 2y$, we get $y = \frac{a^2(3 - \sqrt{3}) + r^2(3 + \sqrt{3})}{6a}$, and therefore $x = \frac{a^2(3 + \sqrt{3}) + r^2(3 - \sqrt{3})}{6a}$.



Again, by Mr. WILLIAM RUTHERFORD and Mr. CHARLES HOLT.

Let AB and CD be the required parallel lines, P the given point, and through P draw IHP perpendicular to AB or CD; then it will appear evident that the centre of the circle given in magnitude must be in the line IHP. Let O be the centre, and through P draw PQB, and join OQ and OB. Put $OP = a$, $PH = b$, $HI = x$, and $HQ = y$; also let the radius of the given circle be r ; then $PQ =$



$\sqrt{b^2 + y^2}$, and $PH : HI :: PQ : QB = \frac{x\sqrt{b^2 + y^2}}{b}$; also $PH :$

$HQ :: PI : IB = \frac{y(b+x)}{b}$; whence $OQ^2 = (a+b)^2 + y^2$, and

$OB^2 = (a+b+x)^2 + \frac{y^2(b+x)^2}{b^2}$; but the tangent to the circle

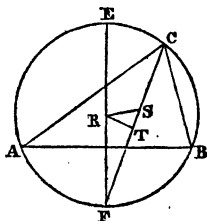
from $Q = \sqrt{OQ^2 - r^2}$, and that from $B = \sqrt{OB^2 - r^2}$, whence, by the question, $2BQ^2 = OQ^2 + OB^2 - 2r^2$, or in symbols, $\frac{2x^2(b^2 + y^2)}{b^2} = (a+b)^2 + y^2 + (a+b+x)^2 + \frac{y^2(b+x)^2}{b^2} - 2r^2$, which, by reduction, gives $2b^2(a+b)^2 + 2b^2(a+b)x - b^2x^2 + (2bx + 2b^2 - x^2)y^2 = 2b^2r^2$.

Our limits would not admit of our inserting more of the valuable solutions sent us, amongst which we must notice Mr. George Duckett's, Mr. William Harrison's, and Mr. Thomas Thompson's. Mr. Holt also sent a good algebraical solution.

X.—Question (30), by Mr. WILLIAM GODWARD.—Given the distance of the centres of the inscribed and circumscribing circles, and the difference of the angles at the base, to determine the plane triangle by geometrical construction, when the distance of the centre of the inscribed circle and the vertex is either given or a maximum.

Answered by Mr. HENRY CLAY, Moulton, Lincolnshire.

Let ABC be the required triangle, R and S the centres of the circumscribing and inscribed circles, EF a diameter perpendicular to the base. Join CF , RS , and demit RT perpendicular to CF , which it will bisect in T . Now the right-angled triangle RTF is given in species, the angle F being = half given difference of A and B ; consequently the ratio of $RF : FT$ is given, say as $1 : n$, or $FT = nRF$. By a known property, $RF^2 = RS^2 + 2SF \cdot ST$; but $FS = 2FT - SC = 2nFR - SC$, and $ST = CT - CS = nFR - SC$, which, by substitution, give $RF^2 = 2nCS \cdot RF = RS^2 - CS^2$. Now when CS is given, RF is readily determined by a lineal section; and when CS is a maximum, we obtain $RS^2 - (1 - n^2) SC^2 = 0$, or $SC = \frac{RS}{(1 - n^2)^{\frac{1}{2}}}$.

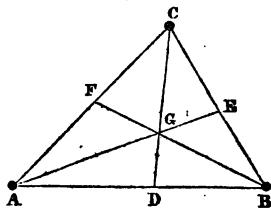


$= \frac{Ac}{A+B}$. Demit the perpendicular CD, and we find $AD = \frac{c^2 + a^2 - b^2}{2c}$; consequently CD and also CE become known.

Again, $A+B+C : CE :: A+B : OC = \frac{(A+B) \cdot CE}{A+B+C}$, and hence the other lines may be found.

Again, by Mr. ROBERT MIDDLEMIST, and Mr. WM. MITCHELL.

Having joined the three bodies, assume D, E, F the common centres of gravity of each two respectively; join CD, AE, BF, intersecting in G the common centre of all three. By mechanics, $A+B : AB :: B : AD = \frac{B \cdot AB}{A+B} :: A : BD = \frac{A \cdot AB}{A+B}$. Hence CD may be found by trigonometry or otherwise, and



$A+B+C : CD :: A+B : CG = \frac{A+B \times CD}{A+B+C}$. Similarly,

$AG = \frac{B+C \cdot AE}{A+B+C}$, and $BG = \frac{A+C \cdot BF}{A+B+C}$, as required.

We would also notice, that neat solutions were sent us by Mr. G. Duckett, Mr. Andrew Middlemiss, and Mr. Wm. Harrison.

XII.—Question (32), by Mr. GRIFFITH JONES.—Integrate the following differential equation, viz. $\left(\frac{\sec. \theta - \tan. \theta}{\sec. \theta + \tan. \theta} \right)$ radius.

Answered by the PROPOSER.

The differential to be integrated should have been printed thus: $\left(\frac{\sec. \theta - \tan. \theta}{\sec. \theta + \tan. \theta} \right) d\theta$ (radius 1), whose integral I shall call w .

Multiply both the numerator and denominator by $\sec. \theta - \tan. \theta$; then we shall have $dw = \left(\frac{\sec.^2 \theta - 2\sec. \theta \times \tan. \theta + \tan.^2 \theta}{\sec.^2 \theta - \tan.^2 \theta} \right) d\theta$; but $\sec.^2 \theta - \tan.^2 \theta = 1$; and by substituting $\frac{1}{\cos. \theta}$ for the se-

cant, and $\frac{\sin. \theta}{\cos. \theta}$ for the tangent, we have $du = \frac{d\theta}{\cos.^2 \theta} - \frac{2\sin. \theta d\theta}{\cos.^2 \theta} + \frac{\sin.^2 \theta d\theta}{\cos.^2 \theta} = \frac{2d\theta}{\cos.^2 \theta} - \frac{2\sin. \theta d\theta}{\cos.^2 \theta} - d\theta$, whose integral is $u = 2\tan. \theta - 2\sec. \theta - \theta + c$. But when θ is $= 0$, $\sec. \theta$ is $= 1$; hence c is $= 2$; consequently $u = 2\tan. \theta - 2\sec. \theta - \theta + 2$.

Again, by Mr. H. CLAY.

There is evidently some omission in the enunciation of this question. I shall, therefore, suppose it required to integrate the expression $d\theta \left(\frac{\sec. \theta - \tan. \theta}{\sec. \theta + \tan. \theta} \right)$ to radius 1. $\int d\theta \left(\frac{\sec. \theta - \tan. \theta}{\sec. \theta + \tan. \theta} \right)$
 $=$ (by putting for $\sec. \theta$, $\tan. \theta$ their values $\frac{1}{\cos. \theta}$, $\frac{\sin. \theta}{\cos. \theta}$)
 $\int d\theta \left(\frac{1 - \sin. \theta}{1 + \sin. \theta} \right) = \theta - 2 \int \frac{\sin. \theta d\theta}{1 + \sin. \theta}$, putting $1 + \sin. \theta = x$,
 $\theta - 2 \int \frac{(x-1)dx}{x\sqrt{2x-x^2}} = \theta - 2 \int \frac{dx}{\sqrt{2x-x^2}}$ and $2 \int \frac{dx}{x\sqrt{2x-x^2}} = \theta - 2 \arccos. (1-x) = \frac{2\sqrt{2x-x^2}}{x} + c$, by restoring the value of x , $\theta - 2(90^\circ + \theta) - \frac{2\cos. \theta}{1 + \sin. \theta} + c = -\theta - \frac{2\cos. \theta}{1 + \sin. \theta} + c$. Now, if the expression should vanish with θ , we shall have $c = 2$, and the corrected integral $= 2(1 - \frac{1}{2}\theta - \frac{\cos. \theta}{1 + \sin. \theta})$.

Otherwise. $\int d\theta \left(\frac{1 - \sin. \theta}{1 + \sin. \theta} \right) = \int d\theta \tan.^2(45^\circ - \frac{1}{2}\theta)$. Put $45^\circ - \frac{1}{2}\theta = \phi$; then $\theta = 90^\circ - 2\phi$, $d\theta = -2d\phi$, and the expression becomes $-2 \int d\phi \tan.^2 \phi = -2 \int \left(\frac{d\phi}{\cos.^2 \phi} - d\phi \right) = -\tan. \phi + 2\phi + c = -2\tan. (45^\circ - \frac{1}{2}\theta) + 2(45^\circ - \frac{1}{2}\theta) + c = 2\tan. (45^\circ - \frac{1}{2}\theta) - \frac{1}{2}\theta + c$; and if it should disappear with θ , c will be $= 2$, and the integrate becomes $2 \{ 1 - \tan. (45^\circ - \frac{1}{2}\theta) - \frac{1}{2}\theta \}$.

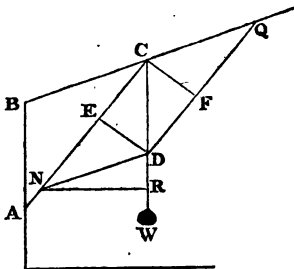
Note.—This integral is exactly the same as that found by the preceding method; for $\tan. (45^\circ - \frac{1}{2}\theta) = \sqrt{\frac{1 - \sin. \theta}{1 + \sin. \theta}} = \sqrt{\frac{(1 - \sin. \theta) \cdot (1 + \sin. \theta)}{(1 + \sin. \theta) \cdot (1 + \sin. \theta)}} = \frac{\sqrt{1 - \sin.^2 \theta}}{1 + \sin. \theta} = \frac{\cos. \theta}{1 + \sin. \theta}$.

The other solutions sent us were very similar to the above.

XIII.—Question (33), by Mr. GRIFFITH JONES.—AB is an upright post fixed firmly in the ground at A; AC a beam which is kept in that position by a rope attached to AB at B, and to AC at C; to the point C a given weight (W) is appended. Required the effect of the forces acting on the several parts of the machine in different directions.

Answered by Mr. JONES, the PROPOSER.

From any point D in CW draw DQ parallel to AC, meeting BC (produced) in Q; also DN parallel to BC, meeting AC in N. Draw NR parallel to the horizon, meeting CW (produced if necessary) in R; also DE and CF at right angles to CA. Now if CD be made to represent the given weight (W), the strain on BC will be denoted by CQ, which being resolved in the directions QF and CF, the former being parallel to CA has its full effect in pressing on that beam, the latter



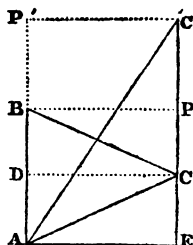
being perpendicular has no power in that direction; also $CE = FD$ denotes the pressure on CA arising from the weight (W) being considered as connected with that part of the crane only; hence the whole pressure on AC in the direction of its length is represented by QD, or its equal CN. Again, CR and NR are the resolved parts of CN acting at A in the directions BA and NR, or CR and NR. But DR and NR are the resolved parts of the force ND or CQ acting at B, but in opposite direction to the former forces; consequently the weight sustained by AB is equal to $CR - DR = CD = (W)$, as it ought to be; also the thrust at A, and the strain at B, in a direction parallel to the horizon, are both represented by NR, but acting in opposite directions. (See *Venturoli's Mechanics*, Cambridge edition, art. 131).—I have not taken any notice of the effect which the weight (W) has to draw AB from its upright position; but, by consulting the above article, the omission cannot be of any great moment.

A good solution, but not essentially different from the above, was that sent by Mr. Jonathan Dryden.

Again, by Mr. JOHN BAINES, and Mr. RICHARD ABBATT.

Let AC, AC' be the positions of the beam, connected by the cord BC, BC' to B, the top of the upright post; demit the

perpendiculars CD, BP, CP, and draw the parallels C'E, BP'. Call the weight of the beam AC, w , which conceive to act at its middle point; then, by the property of the lever, $W + \frac{1}{2}w =$ weight which, acting in the direction CP, would preserve the equilibrium. Let this be represented by CP, and, by the resolution of forces, $\frac{BC}{PC}(W + \frac{1}{2}w) =$ the force in the direction BC, and $\frac{PB}{PC}(W + \frac{1}{2}w) =$ that in the



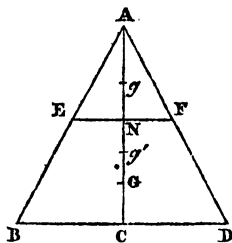
direction BP; also $\frac{AC}{PC}(W + \frac{1}{2}w) =$ force in the direction CA.

XIV.—Question (34), by Mr. WILLIAM RUTHERFORD.—It is required to ascertain the centre of gravity of the frustum of a right cone, by means of the position of the centre of gravity of a complete cone.

Answered by Mr. CHARLES GILL, Mr. RUTHERFORD, and very nearly the same by Mr. W. J. CARR.

Let $BD = a$, $AD = b$, and $ND = h$; then $EN = \frac{a}{b}(b - h)$, the solidity of the whole cone $= \frac{1}{3}a^2b\pi$, and of the cone $AEF = \frac{1}{3}\pi \cdot \frac{a^2}{b^2}(b - h)^2$.

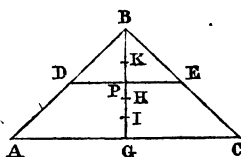
Now if g' is the centre of gravity of the complete cone, g that of the cone AEF , and G that of the frustum; then $AG = \frac{2}{3}(b - h)$, $Ag' = \frac{2}{3}b$, and $gg' = \frac{2}{3}h$. By a property of the centre of gravity, $gg' : g'G :: \frac{1}{3}a^2b\pi$



$= \frac{1}{3}\pi \cdot \frac{a^2}{b^2}(b - h)^2 : \frac{1}{3}\pi \cdot \frac{a^2}{b^2}(b - h)^2 :: b^3 - (b - h)^3 : (b - h)^3$, therefore $Gg' = \frac{2}{3}h(b - h)^3 \div (b^3 - \overline{b - h^3})$, and $AG = \frac{2}{3}hb^3 \div (b^3 - \overline{b - h^3}) = b^3 \div 4(b^2 - bh + \frac{1}{2}h^2)$, as required.

Again, by Mr. ABBATT.

Let ADEC be a truncated cone, ABC the whole cone, H its centre of gravity, K that of the cone DBE, and I the centre of gravity of the truncated cone. Put $AG = a$, $DP = b$, $PG = c$, $\pi = 3.14159$, &c.; then, by the nature of the centre of gravity, trun. cone, $IG + \text{cone DBE}$.



$KG = \text{cone ABC} \cdot HG - \text{cone DBE} \cdot KG$
 $IG = \frac{\text{cone ABC} \cdot HG - \text{cone DBE} \cdot KG}{\text{trun. cone}}$. But cone ABC

$\frac{\pi}{3} \cdot \frac{a^3 c}{a-b}$, cone DBE $= \frac{\pi}{3} \cdot \frac{b^3 c}{a-b}$, $HG = \frac{1}{4} \cdot \frac{ac}{a-b}$, $KG = \frac{1}{4} \cdot$

$\frac{bc}{a-b} + c$, truncated cone $= \frac{\pi}{3}(a^2 + ab + b^2)$, therefore, by substiti-

tion, $IG = \frac{\frac{\pi c^2}{12} \cdot \frac{a^4 - 4ab^3 + 3b^4}{(a-b)^2}}{\frac{\pi}{3}(a^2 + ab + b^2)} = \frac{c}{4} \cdot \frac{a^2 + 2ab + 3b^2}{a^2 + ab + b^2}$. QEI.

Note.—The same will be true of the truncated pyramid, a , b representing any homologous lines in the two ends.

Again, by Mr. OYNS, Mr. COLE, and Mr. ROBERTS.

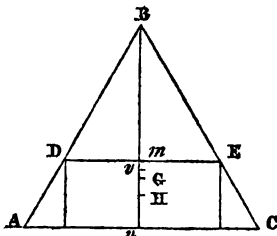
Denote the diameter of the base of the whole cone, or the larger end of the frustum, by d , that of the segment, or the shorter end of the frustum, by d' , the axis of the whole cone by a , and that of the segment by a' , then the height of the frustum $= a - a'$, and, putting $c = .2618$, the solidity of the whole cone will be $= acd^2$, that of the segment $= a'cd'^2$, and, consequently, the solidity of the frustum $= (ad^2 - a'd'^2)c$. Hence, since the distance of the centre of gravity of a cone from the base is $= \frac{1}{4}$ the altitude, we shall have $\frac{1}{4}a$ and $\frac{1}{4}a' + a - a' = a - \frac{3}{4}a'$ for the distance of the centre of gravity of the cone and segment, respectively, from the base of the whole cone; and, putting x for the distance from the base of the centre of gravity of the frustum, we have (*Wood's Mechanics*, prob. 38) $cx(ad^2 - a'd'^2) + a'cd'^2(a - \frac{3}{4}a') = \frac{1}{4}a^2cd^2$, and therefore $x = \frac{\frac{1}{4}a^2d^2 - a'd'^2(a - \frac{3}{4}a')}{ad^2 - a'd'^2}$. W.W.R.

A very good solution was also sent by Mr. Harrison.

XV.—Question (35), by Mr. WILLIAM RUTHERFORD.—Required the position of the centre of gravity of a right cone from which the greatest inscribed cylinder has been excavated.

Answered by Mr. W. CLOUGH, Stott-Hill Academy, Bradford, Yorkshire.

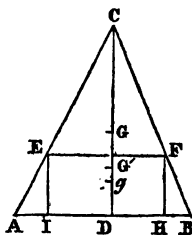
Put the radius of the base $An = a$, the altitude $Bn = b$, and $p = 3.1416$; then, since the altitude of the greatest inscribed cylinder is known to be one-third of the altitude of the cone, $mn = \frac{b}{3}$, $Dm = \frac{2a}{3}$, and its solidity $= \frac{4pba^2}{27}$, whence the solidity of the



body after excavation will be $\frac{pba^2}{3} - \frac{4pba^2}{27} = \frac{5pba^2}{27}$. Now if G and H be the respective centres of gravity of the cone and cylinder, their distances from the base are known to be $\frac{b}{4}$ and $\frac{mn}{2} = \frac{b}{6}$, whence $GH = \frac{b}{4} - \frac{b}{6} = \frac{b}{12}$; and, since the distances of the centres of gravity of bodies are reciprocally as their masses, $\frac{5pba^2}{27} : \frac{4pba^2}{27} :: \frac{b}{12} : \frac{b}{15} = Gv$; consequently $nv = \frac{b}{4} \times \frac{b}{15} = \frac{19b}{60}$, the distance from the base.

Again, by Mr. CLAY, and nearly the same by Mr. R. MIDDLEMIST and Mr. HOGAN.

Let the annexed fig. represent a section of the cone and cylinder through their common axis, G, g, G' the centres of gravity of the cone, cylinder, and remaining solid respectively. Now, by known properties, $DG = \frac{1}{4}CD$, $EI = \frac{1}{2}CD$, $Dg = \frac{1}{2}EI = \frac{1}{4}CD$, therefore $Gg = \frac{1}{12}CD$, cyl. $EI \cdot FH = \frac{1}{3}$ cone, therefore remaining solid $= \frac{2}{3}$ cone. By the lever, $GG' : Gg :: \text{cyl.} : \text{remaining solid} :: \frac{1}{3} : \frac{2}{3} :: 4 : 5$, or $4Gg = 5GG'$, and $GG' = \frac{4}{5}Gg = \frac{1}{5}CD$; therefore $DG = \frac{1}{4}CD + \frac{1}{5}CD = \frac{9}{20}CD$. Q.E.I.



Note.—This is quest. 8 Leeds Correspondent, which appears to have escaped the notice of the very able proposer.

Again, by Mr. COLE and Mr. OYNS, and nearly the same by Mr. ROBERTS.

Let $3a$ denote the axis of the cone, then a will express that of the greatest excavated cylinder, and $\frac{2}{3}a$ and $\frac{1}{3}a$ respectively the distance of the centre of gravity of the cone and cylinder from the base of the cone, and, representing the diameter of the cone's base by b , and consequently that of the cylinder's by $\frac{1}{3}b$, the solidity of the cone will be $\frac{1}{12}\pi b^2$, and that of the cylinder $\frac{1}{12}\pi b^2$, p being $= .78539$, and therefore $\frac{1}{12}\pi p b^2$, the solidity of the part of the cone after the excavation; whence, putting x for the distance of its centre of gravity from the base of the whole cone, we have (*Wood's Mechanics*, prob. 38) $\frac{1}{12}\pi p b^2 x + \frac{1}{12}\pi p a^2 b^2 = \frac{1}{12}\pi p a^2 b^2$, and consequently $x = \frac{2}{3}a$, the distance sought.

XVI.—Question (36), by Mr. D. T. SHERIDAN.—A hollow triangular pyramid, of uniform thickness, made of a cubical foot of lead, is vertically inverted in water; find the ratio of its dimensions, when the immersed surface is a minimum.

Answered by Mr. GEORGE DUCKET, Liverpool.

Put x = the distance from the centre of the base to the middle of one of its sides, y = the distance from the same point in the side to the vertex, *i. e.* its slant side, $a^2 = \frac{1}{3}$ the surface = area of one slant side, and suppose the content to be a maximum when the surface is constant. We have perpendicular height $= \sqrt{y^2 - x^2}$, the side of the base $= 2\sqrt{3} \cdot x$, and content $\sqrt{3} \cdot x^2 \sqrt{y^2 - x^2}$, a maximum $= m$, or $3y^2 x^4 - 3x^6 = m^2$. But $\sqrt{3} \cdot xy = a^2$, therefore $y = \frac{a^2}{\sqrt{3} \cdot x}$, and $y^2 = \frac{a^4}{3x^2}$, hence $m^2 = a^4 x^2 - 3x^6$ differentiate, and $0 = 2a^4 x dx - 18x^5 dx$, therefore $x = \frac{a}{\sqrt{3}}$, and $y = a$; therefore the angles about the vertex are right

angles, and side of base and depth are as $1 : \frac{1}{\sqrt{6}}$, if we take the specific gravity of lead at 11; and supposing the lead to be as thick as it could swim, it would be, side, depth, and thickness of lead, as 1, $\frac{1}{\sqrt{6}}$, $\frac{1 - \sqrt[3]{\frac{11}{10}}}{2\sqrt{3}}$.

Again, by Mr. JOHN BAINES, and Mr. JONATHAN DRYDEN.

The immersed surface will be a minimum when the surface to a given solidity is a minimum; and this is known to be the case when the angle included between the perpendicular of the pyramid and the perpendicular of one of the triangular faces is 45° ;

hence, if the latter perpendicular be represented by 1, the altitude of the pyramid is $= \cos. 45^\circ = \frac{1}{\sqrt{2}}$, and the radius of the circle inscribed in the base $= \sin. 45^\circ = \frac{1}{\sqrt{2}}$; therefore the side of base $= \sqrt{6}$, and the altitude to the side of the base as $1 : 2\sqrt{3}$.

Again, by Mr. GRIFFITH JONES.

Assume S and S' for the specific gravities of water and lead respectively, Q the magnitude of the water displaced, Q' that of lead; hence $QS = Q'S'$, or $Q = \frac{Q'S'}{S}$. I shall assume the base of the

pyramid an equilateral triangle, a the altitude, r the radius of the circle inscribed in the base, m = one of the sides; hence $Q = \frac{3mra}{6} = \frac{1}{2}mra$. But it is well known that the surface is a mini-

mum (the capacity being given), when $3r$ is $= \sqrt{a^2 + r^2}$ (see *Hutton's Course*, vol. iii, theorem 35, p. 50), or $9r^2 = a^2 + r^2$; that is, $r = \frac{a}{\sqrt{8}}$; then by substitution we have $Q = \frac{1}{2} \frac{ma^2}{\sqrt{2}} = \frac{Q'S'}{S}$

$= \frac{1728 \times 11352}{1000} = 19571$ cubic inches; but $m = \frac{a\sqrt{3}}{\sqrt{2}}$, hence

$\frac{a^3 \sqrt{3}}{8} = 19571$, or $a = 141.02$ nearly.

XVII.—Question (37), by Mr. W. STRINGER.—ACB is any right angled triangle whose leg AB is given; upon AC take AP always a mean proportional to AC and BC, and P will be found in a curve, the quadrature of which is required.

Answered by Mr. CLAY.

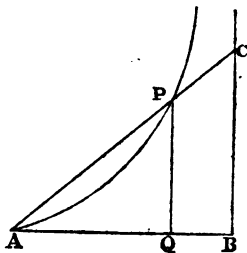
In the annexed fig. put $AB = a$, $\angle CAB = \phi$; then, per trigonometry, $\cos. \phi : a :: \sin. \phi :$

$\frac{a \sin. \phi}{\cos. \phi} = BC$, and $\cos. \phi : a ::$

$1 : \frac{a}{\cos. \phi} = AC$, therefore $AP =$

$(AC \cdot BC)^{\frac{1}{2}} = \frac{a \sin. \frac{1}{2} \phi}{\cos. \phi}$. Again,

$1 : \frac{a \sin. \frac{1}{2} \phi}{\cos. \phi} :: \sin. \phi : \frac{a \sin. \frac{3}{2} \phi}{\cos. \phi} =$



$= PQ$, and $1 : \frac{a \sin. \frac{1}{2} \phi}{\cos. \phi} :: a \cos. \phi : a \sin. \frac{1}{2} \phi = AQ$. When $\phi = 0$, both AQ and QP vanish; and when $\phi = 90^\circ$, AQ is $= a$, and $QP = \infty$, shewing that the curve at A , and approaches BC continued as an asymptote.

Quadrature.— $\int da \sin. \frac{1}{2} \phi \cdot \frac{a \sin. \frac{1}{2} \phi}{\cos. \phi} = \frac{1}{2} a^2 \int d\phi \sin. \phi = -\frac{1}{2} a^2 \cos. \phi$. This, when ϕ is $= 0^\circ$, is $-\frac{1}{2} a^2$, therefore the correct area is $\frac{1}{2} a^2 (1 - \cos. \phi)$, when $\phi = 90^\circ$, $\frac{1}{2} a^2$ for the whole area.

Again, by Mr. MITCHELL and Mr. ANDREW.

Let AB be the given leg of the triangle ABC^* . Put $AB = a$, $AQ = x$, and $QP = y$; then $AP^2 = x^2 + y^2$, and, by similar triangles, $x : y :: x : \frac{ay}{x} = BC$; also $\frac{a^2 y}{x} \sqrt{x^2 + y^2} = AP^2$; whence, by equality, $\frac{a^2 y}{x^2} \sqrt{x^2 + y^2} = \sqrt{x^2 + y^2}$; therefore, by reduction, $y = \frac{x^2}{\sqrt{a^4 - x^4}}$, an equation to the curve, when $x = 0$, $y = 0$; therefore the curve begins at A , when $x = a$, $y = \infty$; therefore BC is an asymptote to the curve.

Quadrature.—Assume $A = \text{area}$, then $dA = y dx = \frac{x^2 dx}{\sqrt{a^4 - x^4}}$, integrating $A = -\frac{1}{2} \sqrt{a^4 - x^4}$; but when $x = 0$, $A = 0$, therefore cor. $= \frac{1}{2} a^2$; hence the correct area (when $x = a$) is barely $= \frac{1}{2} a^2$.

Solutions sent us by Mr. Abbatt, Mr. Gill, and others, were very similar to the above.

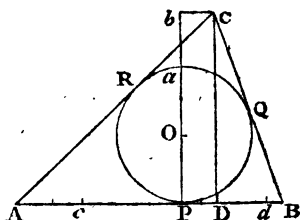
XVIII.—Question (88), by the late Mr. THOMAS WILKINSON.—Given the difference of each side and its adjacent segment of the base made by the perpendicular, and the difference between the perpendicular and diameter of the inscribed circle, to construct the triangle.

Answered by Mr. WRIGHT.

Analysis.—Suppose ACB the triangle sought, $CD \perp AB$, O the centre of the inscribed circle touching the sides at P, Q, R , aP a diameter thereof; draw Cb parallel to AB , meeting Pa at b . By a known property, $AC + BC + AB : 2AB :: CD : 2OP = aP$; by

* See fig. to Mr. Clay's solution.

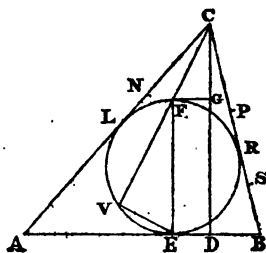
division, $AC + BC - AB : 2AB :: CD - aP : aP$; alternately, $AC + BC - AB = 2CR : CD - aP = ab :: AB : OP$; by a simple property, $AC + BC + AB : CD :: AB : OP$; hence $AC + BC + AB : CD :: 2CR : ab :: m : 1$, a given ratio, for $2CR =$ sum of the two first data, and $ab =$ the last; ergo, $CD^2 : (AC + BC + AB)^2 :: 1 : m^2$:



now in AB lay off $Ad = AC$ and $Bc = BC$, then $BD^2 + CD^2 = (Bd + Dd)^2 + CD^2 = BC^2 = Bc^2 = (Bd + Dd + Dc)^2$; ergo, $CD^2 = Dc^2 + 2Dc \times (Bd + Dd)$, also $AD^2 + CD^2$, or $(Ac + Dc)^2 + CD^2 = AC^2 = Ad^2 = (Ac + Dc + Dd)^2$, from which $CD^2 = Dd^2 + 2Dd \times (Ac + Dc)$, consequently $Dc^2 + 2Dc \times (Bd + Dd) = Dd^2 + 2Dd \times (Ac + Dc)$; from this equality we gain $2Dd \times Ac = Dc^2 - Dd^2 + 2Dc \times Bd$. Now, let $Dc : Dd :: n : 1$; take L a fourth proportional to $2Dd$, Dc and Dd , and $Dc - Dd$, then $Ac = L + nBd$; hence $AC + BC + AB = AB + Bc + Ad = 2Ac + 2Bd + 3cd = 2L + 2(n + 1)Bd + 3cd$; or, making $M = 2L + 3cd$, we have $AC + BC + AB = M + 2(n + 1)Bd$; ergo, $CD^2 = Dc^2 + 2Dc \times (Bd + Dd) : (AC + BC + AB)^2 = (M + 2 + 2n \times Bd)^2 :: 1 : m^2$; ergo, $m^2 Dc^2 + 2m^2(Bd \times Dd) \times Dc = (M + 2 + 2n \times Bd)^2$. Here Dc , Dd , and M are given lines, wherefore Bd is determinable by lineal sections, thence CD and Ac , and of course the triangle ACB .

Again, by Mr. THOMAS TODD, Liverpool.

Geometrical Analysis.—Allow the thing to be accomplished, and ABC the required triangle, ERL the inscribed circle, whose vertical diameter is EF , and points of contact with the sides of the triangle are E , R , and L respectively; demit the $\perp CD$, also draw FG parallel to AB to meet CD in G ; on AC set off $AN = AD$, and on BC take $BS = BD$. Now we have given CS , CN , and CG to construct the triangle. Hence (37 Euclid, 3), $AE = AL$, $BE = BR$, and $CL = CR$; also (construction) $AD = AN$, and $BD = BS$; therefore $ED = SR = LN = FG$. In CB take $CP = CN$, whence,



as $CR = CL$, we have $PR = NL = RS$; therefore $CS - CN = CS - CP = PS = 2LN = 2FG$. Hence FG is a known line, also $FG^2 + CG^2 = FC^2$, therefore FC is known; but it is evident, from what has been proved already, that $CS + CN = CR + CL = 2CR = 2CL$; therefore the tangents CL and CR are each of them known. Through F draw the straight line CFV to meet the periphery of the inscribed circle in V ; join V, E , and (36 *Euclid*, 8) $CV \cdot CF = CL \cdot CR = CL^2$; but CF and CL are known lines, therefore CV and FV are respectively known. Hence (4 *Euclid*, 6) $CG : FV :: FC : FE$, or DG ; therefore EF , the diameter of the inscribed circle, and $DG (= DG + CG)$, the perpendicular, are each of them known, which, together with the rest of the known data, enable us to effect the following

Construction.—With $FG =$ half the difference of the given differences between each side and its adjacent segment of the base, and $CG =$ the difference betwixt the perpendicular and diameter of the inscribed circle, construct the right angled triangle FGC ; then (by *Simpson's Geom.*, 18 of 5) produce CF to V , so that $CF \cdot CV = CL^2 =$ the square of half the sum of the given differences of the sides and segments of the base. Draw VE perpendicular to CV , to meet FE drawn perpendicular to GF in E ; about the right angled triangle FVE describe the circle $ERFLV$. Now, parallel to FG , at the distance EF , draw the straight line AEB to meet the tangential straight lines CLA, CRB , in A and B respectively, and ABC will be the triangle wanted.—The demonstration is obvious from the analysis.

The Editor with reluctance omitted the solutions sent by Mr. Gill, Mr. Rutherford, and Mr. R. Middlemist.

XIX.—Question (39), by Mr. WILLIAM WRIGHT.—If a number A be the sum of two squares whose difference is a square, or the difference of two squares whose sum is a square, prove that A is the area of a rational right angled triangle. If A represent twice the sum of two squares whereof twice their difference is a square, or twice the difference of two squares whereof twice their sum is a square, prove that A is in either case the area of a rational right angled triangle.

Answered by Mr. WRIGHT, the Proposer.

Let A denote the area of a right angled triangle, and p one of the legs; then $\frac{A}{\frac{1}{2}p}$ is the other leg, and by the property of a right angled triangle $\frac{A^2}{\frac{1}{4}p^2} + p^2 =$ square of the hypotenuse. Multiply this by $\frac{1}{4}p^2$, and $A^2 + \frac{1}{4}p^4 =$ a square, say $= (q \pm \frac{1}{2}p^2)^2 =$

$/q^2 \pm qp^3 + \frac{1}{4}p^4$; whence $p^2 = \frac{A^2 - q^2}{q}$, or $\frac{q^2 - A^2}{q}$, accordingly as the positive or negative signs are used. Now, if $A = m^2 + n^2$, and $q = m^2 - n^2$, then $\frac{A^2 - q^2}{q} = \frac{4m^2n^2}{m^2 - n^2}$, which is a square when $m^2 - n^2$ is a square; also, if $q = m^2 + n^2$, and $A = m^2 - n^2$, then $\frac{q^2 - A^2}{q} = \frac{4m^2n^2}{m^2 + n^2}$, which is a rational square when $m^2 + n^2$ is such; which proves the first part of the question.

For the latter part of the question, if $A = 2(m^2 + n^2)$ and $q = 2(m^2 - n^2)$, then $\frac{A^2 - q^2}{q} = \frac{16m^2n^2}{2(m^2 - n^2)}$, which is a square when $2(m^2 - n^2)$ is such. Again, if $q = 2(m^2 + n^2)$ and $A = (2m^2 - n^2)$, then $\frac{q^2 - A^2}{q} = \frac{16m^2n^2}{2(m^2 + n^2)}$ = a square, which is the case when $2(m^2 + n^2)$ is a square.

Again, by Mr. W. S. B. WOOLHOUSE, North Shields.

Let A represent n times the sum of two squares, whereof n times their difference is a square, or n times the difference of two squares whereof n times their sum is a square; then is A in either case the area of a rational right angled triangle. For, denoting the squares by a^2 and b^2 , we have $A = n(a^2 \pm b^2)$ and $n(a^2 \mp b^2) = \square$, say $= c^2$: then is $A = \frac{n}{c}(ab) \times \frac{c(a^2 \pm b^2)}{(ab)}$, the area of a rational right angled triangle, whose legs are $x = \frac{2n}{c}(ab)$ and $y = \frac{c(a^2 \pm b^2)}{(ab)}$; for, since $\frac{cx}{n}(ab) = 2(ab)^2 = 2a^2b^2$, and $\frac{cy}{n}(ab) = \frac{c^2}{n}(a^2 \pm b^2) = (a^2 \mp b^2)(a^2 \pm b^2) = a^4 - b^4$, therefore $\frac{cx}{n}(ab) = \sqrt{\{ (2a^2b^2)^2 + (a^4 - b^4)^2 \}} = a^4 + b^4$, and $z = \frac{n}{c} \cdot \frac{a^4 + b^4}{ab}$, a rational value.

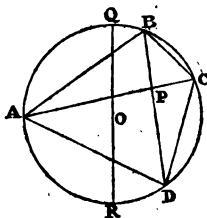
The question might have been still more generally enunciated, thus—If A denote the sum or difference of any two numbers or values whereof the difference or sum of their reciprocals is a square, then is A the area of a rational right angled triangle: for in this case (which evidently comprehends the former), assuming $A = a \pm b$, and $\frac{1}{b} \mp \frac{1}{a} = c^2$, we have the legs of the triangle $= \frac{2}{c}$, and $c(a \pm b)$, and the hypotenuse $= \frac{a^2 + b^2}{c(ab)} = \frac{a^2 + b^2}{a \mp b}$.

Mr. Holt's answer was reluctantly cancelled for want of room.

XX.—PRIZE QUESTION (40), by Mr. WILLIAM WRIGHT.—Find a trapezium, such that the sides, area, diagonals, and diameter of the circumscribing circle, shall be whole numbers, and the perimeter a rational square.

Answered by Mr. WRIGHT, the Proposer.

Let ABCD be a trapezium inscribed in a circle, of which the diameter is QR; let the diagonals AC, BD, intersect at right angles at P, which will simplify the solution.



Now, assume $AB = v^2 + x^2$, $AP = v^2 - x^2$, $BC = y^2 + z^2$, $CP = y^2 - z^2$, then $BP = 2vx$, also $BP = 2yz$, wherefore $BP = 2vx = 2yz$; hence the numerical value of BP must be such that it may be divisible into two rational factors two different ways; hence, make $v = \frac{my}{n}$, and $x = \frac{nx}{m}$, then $AB = \frac{m^4y^2 + n^4x^2}{n^2m^2}$; and, by similar triangles, APB,

DCP, $BP : AB :: CP : CD = \frac{m^4y^2 + n^4x^2}{n^2m^2} \times \frac{y^2 - z^2}{2yz}$; also, by the same reason, $BP : BC :: AP : AD = \frac{m^4y^2 - n^4x^2}{n^2m^2} \times \frac{y^2 + z^2}{2yz}$;

likewise $AP + CP = AC = \frac{m^4y^2 - n^4x^2}{n^2m^2} + y^2 - z^2$, and by the circle, $\frac{AP \times PC}{BP} = DP = \frac{m^4y^2 - n^4x^2}{n^2m^2} \times \frac{y^2 - z^2}{2yz}$; consequently,

$DP + BP = BD = \frac{m^4y^2 - n^4x^2}{n^2m^2} \times \frac{y^2 - z^2}{2yz} + 2yz$. Again, by a

known property, $\frac{AB \times BC}{BP} = QR = \frac{m^4y^2 + n^4x^2}{n^2m^2} \times \frac{y^2 + z^2}{2yz} =$

diameter of the circumscribing circle. Now, if we multiply the sides, diagonals, and diameter by $n^2m^2 \times 2yz$, we shall have $AB = (m^4y^2 + n^4x^2) \times 2yz$, $BC = (y^2 + z^2) \times 2yzm^2n^2$, $CD = (m^4y^2 + n^4x^2) \times (y^2 - z^2)$, $AD = (m^4y^2 - n^4x^2) \times (y^2 + z^2)$, $AC = \{m^4y^2 - n^4x^2 + (y^2 - z^2) \times n^2m^2\} \times 2yz$, $BD = (m^4y^2 - n^4x^2) \times (y^2 - z^2) + 4y^2z^2n^2m^2$, $QR = (m^4y^2 + n^4x^2) \times (y^2 + z^2)$, and the area $\frac{1}{2}AC \times BD = yz \times \{m^4y^2 - n^4x^2 + (y^2 - z^2) \times n^2m^2\} \times \{m^4y^2 - n^4x^2 + (y^2 - z^2) \times n^2m^2 + 4y^2z^2n^2m^2\}$. These are general expressions, which will give the sides, area, diagonals, and diameter of the circumscribed circle in integer

numbers where y, z, m, n , may be taken at pleasure, so that y exceed z and m exceed n ; but we may also multiply the sides, diagonals, and diameter by any integer x' , and they will answer the above conditions; and it only remains to make $(AB + BC + CD + AD) \times x'$ a square, which is the case when $x' = AB + BC + CD + AD$. I now proceed to find numerical values of the sides, &c. If $m = 2, n = 1, y = 2, z = 1$, then $AB = 260, BC = 80, CD = 195, AD = 315, AC = 300, BD = 233$, and $QR = 325$; also $x' = 850 = 25 \times 34$; *ergo*, we may take $x' = 34$, and the four sides are 8840, 2720, 6630, 10710; the diagonals are 8602, 10200; and the diameter 11050; whence the area is 54621000. Lastly, the perimeter is 28900 = $(170)^2$ a rational square as required; and from the general expressions above given innumerable answers may be had.

Note.—If, instead of the perimeter, the difference of the diagonals had been required a square, then $AC - BD = 47x'$ a square, which is so when $x' = 47$, whence $AB = 12220, BC = 3760, CD = 9165, AD = 14805, AC = 14100, BD = 11891, QR = 15275$, the area = 88831550, and $AC - BD = 2209 = (47)^2$, a square, as it ought.

Suppose the sum of the diagonals a square, then $AC + BD = 553x'$ a square, which is the case when $x' = 553$, whence $AB = 143780, BC = 44240, CD = 107835, AD = 174195, AC = 165900, BD = 139909, QR = 179725$, the area = 11605451550, and $AC + BD = (553)^2$, a rational square.

Again, by Mr. WOOLHOUSE.

Supposing the radius of the circumscribing circle = unity, and representing the four arcs to which the sides are chords by $2\phi, 2\phi', 2\phi'',$ and $2\phi'''$, we have the chords, or the four sides, $s, s', s'',$ and s''' , together with the diagonals d and d' , expressed thus; $s = 2\sin. \phi, s' = 2\sin. \phi', s'' = 2\sin. \phi'', s''' = 2\sin. \phi'''$, $d = 2\sin.(\phi + \phi') = 2(\cos. \phi \sin. \phi' + \cos. \phi' \sin. \phi)$, and $d' = 2\sin.(\phi' + \phi'') = 2(\cos. \phi' \sin. \phi'' + \cos. \phi'' \sin. \phi')$. Also, if the radii be drawn to the four corners or angular points, the trapezium will be divided into four triangles, the summation of which gives the area = $\cos. \phi \sin. \phi + \cos. \phi' \sin. \phi' + \cos. \phi'' \sin. \phi'' + \cos. \phi''' \sin. \phi'''$. It hence appears that the sides, diagonals, and area are all of them rational when the values of the cosines and sines of the four arcs are rational, which may easily be made so by computing all of them except one from the forms $\frac{n^2 - 1}{n^2 + 1}$ and

$\frac{2n}{n^2 + 1}$; and if the perimeter = p , it can immediately be made a square by multiplying each linear value by r^2p , r being any num-

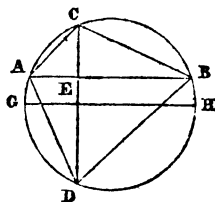
ber whatever which can be assumed so as to take away fractions ;
 thus, for example, supposing $n = 3$, we obtain $\cos. \phi = \frac{4}{5}$ and
 $\sin. \phi = \frac{3}{5}$; also, assuming $n = 5$, we may have $\cos. \phi' = \frac{5}{13}$ and
 $\sin. \phi' = \frac{12}{13}$. Again, taking $n = 7$, we get $\cos. \phi'' = \frac{24}{25}$ and $\sin.$
 $\phi'' = \frac{7}{25}$: therefore $\sin. (\phi + \phi') = \cos. \phi \sin. \phi' + \cos. \phi' \sin. \phi$
 $= \frac{63}{65}$, $\cos. (\phi + \phi') = \cos. \phi \cos. \phi' - \sin. \phi \sin. \phi' = -\frac{16}{65}$; and,
 similarly, $\sin. (\phi' + \phi'') = \frac{328}{325}$, $\sin. \phi''' = \sin. (\phi + \phi' + \phi'')$
 $= \sin. \{ (\phi + \phi') + \phi'' \} = \frac{56}{65}$, and $\cos. \phi''' = -\cos. \{ (\phi + \phi') +$
 $+ \phi'' \} = \frac{33}{65}$. Therefore, from the foregoing we have the dia-
 meter of the circle $= 2$, $s = \frac{6}{5}$, $s' = \frac{24}{13}$, $s'' = \frac{14}{25}$, $s''' = \frac{112}{65}$, $d =$
 $\frac{126}{65}$, $d' = \frac{646}{325}$, the area $= \frac{162792}{325^2}$, and the perimeter $= \frac{1732}{325}$;
 consequently, taking $r = \frac{65^2}{2}$, and multiplying each by $\frac{1732}{325} \cdot \frac{65^4}{2^2}$
 $= 5629 (65^2)$, we derive, the diameter of the circumscribing circle
 $= 47565050$, $s = 28539030$, $s' = 43906200$, $s'' = 13318214$,
 $s''' = 40979120$, $d = 46101510$, $d' = 47272342$, the area $=$
 871730538974568 , and the perimeter $= 126742564 = (11258)^2$.

Again, by Mr. CLAY.

Let ABCD represent the required
 trapezium, its diagonals AB, CD in-
 tersecting at right angles in E. Put
 $AC = (v^2 + 1)2fn$, $AE = (v^2 - 1)2fn$,
 and $BC = (f^2 + n^2)2v$; then $CE =$
 $(AC^2 - AE^2)^{\frac{1}{2}} = 4vfn$, and $EB =$
 $(CB^2 - CE^2)^{\frac{1}{2}} = (f^2 - n^2)2v$; whence
 $ED = \frac{AE \cdot BE}{CE} = (v^2 - 1) \cdot (f^2 - n^2)$.

Also, by similar triangles, $AE : AC$

$\therefore DE : DB = \frac{AC \cdot DE}{AE} = (v^2 + 1) \cdot (f^2 - n^2)$, and $BE : BC$



$\therefore DE : AD = \frac{BC \cdot DE}{BE} = (v^2 - 1) \cdot (f^2 + n^2)$. By a known

theorem, the diameter of the circumscribing circle $GH = \frac{AC \cdot BC}{EC}$
 $= (v^2 + 1) \cdot (f^2 + 1)$; also, diagonal $AB = AE + BE =$
 $(v^2 - 1)2fn + (f^2 - n^2)2v$, diagonal $CD = CE + DE = 4vfn$
 $+ (v^2 - 1) \cdot (f^2 - n^2)$, and area $= \frac{1}{2}AB \cdot CD = \frac{1}{2}(v^2 - 1)fn$
 $+ (f^2 - n^2)v \cdot \frac{1}{2}4vfn + (v^2 - 1) \cdot (f^2 - n^2) \cdot \frac{1}{2}$. Now it is
 evident, that the preceding expressions give the required parts of
 the trapezium whole numbers when f , v , and n are so; hence, it
 only remains to find such integer values of f , v , and n as will
 render $AC + BC + BD + AD$ an integral square. Now $AC +$
 $BC + BD + AD = (v^2 + 1)2fn + (f^2 + n^2)2v + (v^2 + 1) \cdot$
 $(f^2 - n^2) + (v^2 - 1) \cdot (f^2 + n^2) = 2(v^2 + v)f^2 + 2n(v^2 + 1)f$
 $+ 2n^2(v - 1)$. Put $2(v - 1) = 4m^2$, then $v = 2m^2 + 1$, which,
 substituted in the preceding expression, and divided by 4, gives
 $(2m^4 + 3n^2 + 1)f^2 + n(2m^4 + 2m^2 + 1)f + m^2n^2 = \square$,
 say $(sf - nm)^2 = s^2f^2 + 2smnf + m^2n^2$, whence $f =$
 $\frac{n(2m^4 + 2m^2 + 1 + 2sm)}{s^2 - (2m^4 + 3m^2 + 1)}$. Make $n = r \{ s^2 - 2m^4 + 3m^2 + 1 \}$,
 then f becomes $= r(2m^4 + 2m^2 + 1 + 2sm)$, where r , m , s are
 indeterminate.

Example.—Let $r = 1$, $m = 1$, and $s = 3$; then $n = 3$, $f = 1$,
 and $v = 3$; whence $AC = 165 \times 4$, $BC = 195 \times 4$, $BD = 280$
 $\times 4$, $AD = 260 \times 4$, their sum $= 900 \times 4 = 30^2 \times 2^2$, $GH =$
 325×4 , $AB = 300 \times 4$, $CD = 323 \times 4$, and the area $= 49700$
 $\times 4^2$; or, omitting the common square multiplier 4, the sides are
 165, 195, 280, and 260, their sum $900 = 30^2$, the diameter of the
 circumscribing circle $= 325$, and the diagonals 300 and 323.
 These numbers are, perhaps, the smallest the question admits of
 when the diagonals intersect at right angles, but without that limi-
 tation there are, probably, many smaller that would answer.

*The Editor was reluctantly obliged to submit to the cancelling
 the solutions of Mr. Gill, Mr. Mitchell, and Mr. Andrew, when
 prepared for press.*

NEW MATHEMATICAL QUESTIONS.

Question (1), by Mr. N. J. ANDREW, Penzance, Cornwall.

ABC is a given semicircle; now suppose two bodies to be impelled with given uniform velocities (at the same time), one in the direction of the diameter AB, and the other in the periphery AC. Required their situations when their distance is a maximum.

Question (2), by Mr. JOHN BAINES, Master of Thornhill Grammar School, near Wakefield.

A given area is formed into an isosceles triangle, and suspended from its vertex by a string of a given length; and being made to vibrate edgewise, the time of one oscillation is a second. Required the dimensions of the triangle.

Question (3), by the same Gentleman.

A hollow sphere of 15 inches radius has the greatest solid cylinder possible placed in it, having its axis vertical: if the vacuity be filled with water, and an orifice of half an inch square opened at its lowest part, in what time will the water run out?

Question (4), by Mr. PATRICK O'CALLAGHAN, Limerick, Ireland.

VX, VY, are right lines given in position, and P a given point: through P, V, describe any circle whatever, meeting the right lines at X, Y; through which points draw a straight line, and describe the curve to which it is a tangent.

Question (5), by Mr. JOHN CAM, Torpenhow.

Suppose two bodies to fall at the same instant down two planes from a point in their intersection; it is required to find the position of the planes, so that at the end of a given time they may be at a given distance from each other in a vertical line.

Question (6), by Mr. HENRY CLAY, Moulton, Lincolnshire.

AB is the diameter of a given circle, AC any chord, CD the right sine, CP perpendicular to AC and equal to CD. Required the quadrature of the curve which is the locus of P.

Question (7), by Mr. W. CLOUGH, Stott-Hill Academy, Bradford, Yorkshire.

If GD be any sine of the given semicircle AGF, and on AD a semicircle be described within the former; it is required to find the quadrature of the curve whose locus is the centre of the circle described to touch the two semicircles, and also the sine on the same side that the less semicircle touches it.

NEW QUESTIONS.

Question (8), by COLLECTOR.

To find rational numerical values for the sides of any number of pairs of *different* isosceles triangles, all having the same perimeter, and each pair of triangles the same rational area.

Question (9), by the same.

Suppose a given hemisphere and right cylinder to stand upon the same plane, with their surfaces intersecting each other: it is required to find the equation of the curve which is the locus of that intersection, the distance of the centres of the hemisphere and base of the cylinder being given.

Question (10), by Mr. JONATHAN DRYDEN.

Suppose the frustum of an oblong pyramid stands with its smaller end upon two blocks, one at each side, that make an angle ϕ with the horizon, the length and width of the bottom being m and n , that of the top a and b , and its height h : to determine the content of the part pressing each block.

Question (11), by Mr. GEORGE DUCKET, Liverpool.

Suppose a flexible chain 40 inches long, 30 inches of which be laid straight on a horizontal table perpendicular to the edge, the rest hanging freely down and left to descend; required the final velocities of the chain, and times of quitting the table, first when the friction is a fourth of the weight of that part on the table, secondly when there is no friction.

Question (12), by Mr. CHARLES GILL, Seamer, near Scarborough.

PQ, MN are segments of two adjacent spires of the spiral of Archimedes; CMP, CNQ two radii vectores from the centre C. Given the two segments NQ, MP of these lines, and the difference of CN, CM, together with the area of the trapezoidal space MPQN; to find the angle contained between CP, CQ, and the two segments PQ, MN.

Question (13), by Mr. THOMAS HOGAN, Wells Street, Oxford Street.

Having given two distances of a comet in its parabolic orbit from the sun, and the angle included, investigate this proportion for determining the perihelion (which is here supposed to lie between those distances). The sum of the square roots of the distances is to the difference as the cotangent of the semi-sum of half the true anomalies to the tangent of the semi-difference of the same.

Question (14), by Mr. GRIFFITH JONES, Liverpool.

A cylinder of given dimensions, containing air of a given density, being placed in water at a given distance below the surface, and an orifice of a given area being made in the bottom; required the quantity in the cylinder when the motion ceases, also the quantity when the velocity at the orifice is given, and the time of filling, the axis of the cylinder being supposed vertical.

NEW QUESTIONS.

Question (15), by Mr. GRIFFITH JONES.

A rod of given weight (w), which passes through two small rings fixed in the same vertical line, by its pressure puts in motion along a smooth horizontal, a solid inclined plane of given weight (q), length of the latter being 100 inches, and altitude 36 inches. Suppose the point of contact of the rod and plane at the commencement of motion to be infinitely near the top of the latter; required the time in which the plane quits the rod.

Question (16), by Mr. ROBERT MAFFETT, Plymouth.

In the latitude of $50^{\circ} 22'$ north, on a horizontal plane, stands a vessel in the form of a paraboloid (on its vertex): on the 20th of May, 1828, in the afternoon, the sun's ray was observed to pass over the brim of the vessel, and meet the opposite curve side in the same point as the focal tangent of its generating parabola did, when the vessel was empty; but it being full of water, the same ray coincided with the focus. Now, at this instant, if an orifice be opened at the vertex whose area is .7854, it is required to determine the exact time P.M. on the above day, when the vessel will be completely empty, the length of the first ray within the vessel being longer than the second by $8 \times 5 - 3\sqrt{2}$.

Question (17), by Mr. DAVID ROBERTS, Stonehouse, Devon.

Suppose two perforations made through the earth, one at the equator and another at the pole, meeting and intersecting one another at the centre, and a heavy body be let fall from the surface into each at the same moment of time, what would be the difference between the times of their returns to the points from whence they were let fall, supposing the equatorial diameter of the earth to exceed the polar by 26 miles, the former being estimated at 7934 miles?

Question (18), by Mr. THOMAS TODD, Liverpool.

I am persuaded, though many good rules have already been given to determine the solidity of a conic frustum, that one superior to any of them, when tables of circular areas are used, can yet be discovered; such a one, therefore, is here required.

Question (19), by Mr. WILLIAM WRIGHT, Hull.

CD, CE are tangents to the given circle DEPP. Find, geometrically, the points P, P in the circle, so that if perpendiculars PR, PQ be demitted upon CD, CE, the sum of mPR and nPQ shall be a maximum or minimum.

PRIZE QUESTION (20), by Mr. W. S. B. WOOLHOUSE.

The nature of n different functions, $\phi_1(x_1, x_2, x_3, \dots, x_n)$, $\phi_2(x_1, x_2, x_3, \dots, x_n)$, $\phi_3(x_1, x_2, x_3, \dots, x_n)$ &c. \dots $\phi_n(x_1, x_2, x_3, \dots, x_n)$, of n independent values x_1, x_2, x_3 &c. \dots x_n are given. It is required to give a method of ascertaining whether or not a dependency exists amongst them.

A LIST

OF THE

MATHEMATICAL CONTRIBUTORS,

And the Questions answered by each.

ABBATT	1, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18
ANDREW	1, 3, 4, 5, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, Pr.
BAINES	1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18
BATES	7
CARR	1, 3, 5, 10, 14, 15, 18
CLAY	3, 6, 7, 8, 10, 11, 12, 14, 15, 16, 17, 18, Pr.
CLOUGH	1, 2, 8, 10, 11, 14, 15, 16, 17, 18
COLES	1, 5, 7, 8, 10, 11, 14, 15, 17, 18
DAWSON	7, 8, 10, 11, 15, 17
DRYDEN	3, 4, 5, 6, 11, 12, 13, 14, 15, 16, 17, 18
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GILL	All the Questions
HARRISON	1, 2, 7, 8, 9, 11, 14, 15
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HOLT	1, 2, 8, 9, 10, 11, 12, 14, 15, 17, 18, 19, Pr.
JONES	3, 5, 11, 12, 13, 14, 15, 16, 17
KNIVETON	2, 7, 8, 10, 12, 17
LOMAX	1, 10, 17, 18
MAFFETT	2, 5, 6, 7, 8, 10, 11, 14, 15, 16, 17, 18, Pr.
MIDDLEMISS ..	1, 2, 3, 7, 8, 11, 14, 15, 18
MIDDLEMIST ..	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18
MITCHELL	1, 3, 4, 6, 7, 8, 10, 11, 12, 14, 15, 17, 18, Pr.
OAKES	2, 7, 8, 10, 12, 17
OYNS	1, 5, 7, 8, 10, 11, 14, 15, 17, 18
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ROBERTS	1, 3, 4, 5, 7, 9, 10, 11, 13, 14, 15, 16, 17, 18, Pr.
RUTHERFORD ..	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 17, 18
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WOOLHOUSE ..	19, Pr.
WRIGHT	4, 18, 19, Pr.
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THE MATHEMATICAL ASSOCIATE.

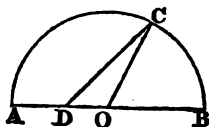
ANSWERS TO THE QUESTIONS

PROPOSED LAST YEAR.

I.—Quest. (41), by Mr. N. J. ANDREW.—ABO is a given semi-circle. Now, suppose two bodies to be impelled with given uniform velocities (at the same time), one in the direction of the diameter AB, and the other in the periphery AC; required their situations when their distance is a maximum.

Answered by Mr. WILLIAM MITCHELL, St. Levan, Penwith, Cornwall, and Mr. LOVELL SQUIRE, York.

Let CD be any cotemporary places of the bodies, and the rest as per figure. Put radius of the circle (for simplicity's sake) = 1; velocity of the body in the periphery : that in the diameter :: 1 : m, and AC = θ . Then is AD = $m\theta$, and OD = $1 - m\theta$; whence, by trigonometry, in the $\triangle DCO$,



$CD^2 = 1 + (1 - m\theta)^2 - 2(1 - m\theta) \cos. \theta$, which is to be a maximum. Differentiating and reducing, it becomes $(m - \sin. \theta) m\theta + \sin. \theta + 2m \cos. \theta - 2m = 0$; from which equation θ may be found, and consequently the position of CD determined.

Very similar were the answers sent us by Messrs. Kniveton, Dryden, and Oakes.

II.—Question (42), by Mr. J. BAINES.—A given area is formed into an isosceles triangle, and suspended from its vertex by a string of a given length; and being made to vibrate edgewise, the time of one oscillation is a second Required the dimensions of the triangle.

Answered by the PROPOSER.

Put a^2 = the given area, $b = 39\frac{1}{2}$ inches = the length of the second's pendulum, and l = the length of the string; also, put x and y = the variable perpendicular and semi-base of the isosceles triangle; then, by *Simpson's Fluxions*, article 193, *Davis's* edition, the distance of the centre of oscillation from the point of

suspension is $\frac{\int (l+x)^2 y dx + \frac{1}{2} \int y^3 dx}{\int (l+x) y dx} = b$, by the question;

but $xy = a^2$, or $y = a^2 x^{-1}$; hence $\int (l+x)^2 a^2 x^{-1} dx + \frac{1}{2} a^6 \int x^{-3} dx = a^2 b \int (l+x) x^{-1} dx$, or l^2 (hyp. log. x) + $2lx + \frac{1}{2} x^2 - \frac{1}{6} a^4 x^{-2} = bl$ (hyp. log. x) + bx , from x may be found when a and l are given in numbers.

Cor.—If $l = b$, the hyp. log. x vanishes, and $3x^4 + 6bx^2 = a^4$, which is obtainable by a biquadratic.

Again, by Mr. T. PRINGLE, *Alumnick*.

Let AED be an isosceles triangle, and SA the string of a given length = $d = (12 \text{ inches})$ (see figure, *Dealtry's Fluxions*, page 86, second edition), therefore we have $SO = \frac{6d^2 + 8dx + 3x^2}{6d + 4x} = l$

or $39\frac{1}{2}$. This quadratic equation reduced, and substituting 12 inches for d , we obtain $x^2 - 20\frac{1}{2}x = 651$; hence $x = 37.76$. Suppose the area 600 inches; then ED = 31.778, and AE = 40.967.

III.—Question (43), by Mr. J. BAINES.—A hollow sphere of 15 inches radius has the greatest solid cylinder possible placed in it, having its axis vertical: if the vacuity be filled with water, and an orifice of half an inch square opened at its lowest part, in what time will the water run out?

Answered by the PROPOSER.

First, for the greatest inscribed cylinder, put $r = 15$ inch. = the radius of the sphere, and $2x$ = the length of the cylinder;

then $r^2 - x^2 =$ square of the radius of its end, and $x(r^2 - x^2) = u =$ a maximum; hence $\frac{du}{dx} = r^2 - 3x^2 = 0$, which gives $2x = 2r\sqrt{\frac{1}{3}}$, and diameter cylinder $2r\sqrt{\frac{1}{3}}$; hence the height of the segment above and below the cylinder $= r(1 - \sqrt{\frac{1}{3}})$.

Secondly, for the time of exhaustion, put $x =$ the part the fluid has descended in any time t , $A =$ the area of the descending surface $= \pi(2rx - x^2)$, corresponding to the upper and lower segments, and $= \pi(-\frac{1}{3}r^2 + 2rx - x^2)$ for the part occupied by the cylinder; and $g = 193$ inches, also $a = \frac{1}{2} =$ the area of the orifice; then, by *Marratt's Mechanics*, article 705, $dt =$

$$\frac{A dx}{2a\sqrt{g}(2r - x)} = \frac{\pi}{2a\sqrt{g}} \cdot \frac{dx(2rx - x^2)}{\sqrt{(2r - x)}}, \text{ which, integrated,}$$

$$\text{gives } t = \frac{\pi}{2a\sqrt{g}} \cdot \sqrt{(2r - x)} \times (-\frac{1}{15}r^2 - \frac{4}{15}rx + \frac{2}{3}x^2)$$

$$= \frac{\pi}{30a\sqrt{g}} (-16r^2 - 4rx + 6x^2) \times \sqrt{(2r - x)}, \text{ which between}$$

$$x = 0 \text{ and } x = r(1 - \sqrt{\frac{1}{3}}), \text{ gives } t = \frac{2\pi r^{\frac{5}{2}}}{15a\sqrt{g}} \left\{ 4\sqrt{2} - \frac{1}{3}\sqrt{(129 + 67\sqrt{3})} \right\} = \text{the time of emptying the upper segment. Again, be-}$$

$$\text{tween } x = r(1 + \sqrt{\frac{1}{3}}) \text{ and } x = 2r, \text{ we get } t = \frac{2\pi r^{\frac{5}{2}}}{15a\sqrt{g}} \left\{ \frac{1}{3}\sqrt{(129 - 67\sqrt{3})} \right\} = \text{the time of emptying the lower segment.}$$

$$\text{Lastly, for the part occupied by the cylinder, we have } dt = \frac{\pi}{2a\sqrt{g}} \cdot \frac{dx(-\frac{1}{3}r^2 + 2rx - x^2)}{\sqrt{(2r - x)}}, \text{ and consequently } t = \frac{\pi}{30a\sqrt{g}} (4r^2 - 4rx + 6x) \times \sqrt{(2r - x)}, \text{ which between } x = r(1 - \sqrt{\frac{1}{3}})$$

$$\text{and } x = r(1 + \sqrt{\frac{1}{3}}), \text{ gives } t = \frac{2\pi r^{\frac{5}{2}}}{15a\sqrt{g}} \left\{ \frac{1}{3}\sqrt{(3 + \sqrt{3})} + \frac{1}{3}\sqrt{(3 - \sqrt{3})} \right\} = \text{the time of emptying the middle part; hence the whole}$$

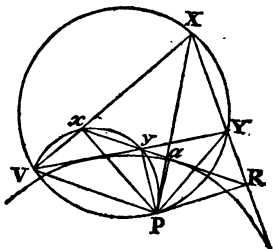
$$\text{time of exhaustion} = \frac{2\pi r^{\frac{5}{2}}}{15a\sqrt{g}} \left\{ 4\sqrt{2} - \frac{1}{3}\sqrt{(129 + 67\sqrt{3})} + \frac{1}{3}\sqrt{(129 - 67\sqrt{3})} + \frac{1}{3}\sqrt{(3 + \sqrt{3})} + \frac{1}{3}\sqrt{(3 - \sqrt{3})} \right\} = \frac{\pi r^{\frac{5}{2}}}{a} \sqrt{\frac{r}{g}}$$

$$\times .511919 = 403.5113 \text{ seconds} = 6 \text{ minutes } 43.5113 \text{ seconds.}$$

IV.—Question (44), by Mr. PATRICK O'CALLAGHAN.—VX, VY, are right lines given in position, and P a given point : through P, V, describe any circle whatever, meeting the right lines at X, Y; through which points draw a straight line, and describe the curve to which it is a tangent.

Answered by Mr. W. WRIGHT, Hull.

Investigation.—Let PVXY be any circle meeting the given lines at X, Y, through which points draw an indefinite right line; upon VP as a diameter describe a semicircle, cutting VX, VY at x and y ; draw xy meeting XY at R; then xy must be a tangent to the curve. Draw Px, Py, PX, PY, and PR. By a noted property of the circle, the angle PVx is the supp. of the angles Pyx, PYX; wherefore these angles are equal; hence their supplemental angles PyR, PYR are equal; consequently a circle will pass through P, y , Y, R; and as the angle PyY is a right angle, PRY is also a right angle; but P and the right line xy R are given in position; hence by proposition 12, parabola, *Emerson's Conics*, XY is a tangent to a parabola having its focus at P, and drawing Pa \perp xR, a is its vertex.



Scholium.—We may easily prove that VX, VY are tangents to the parabola, from which it appears that a circle passing through the intersections of any three tangents to a parabola, also passes through the focus.

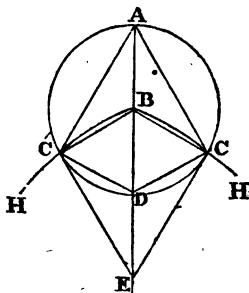
Mr. W. Temple, Picton Place, Newcastle, sent good answers to this and several other questions, but the Editor, unfortunately, mislaid his letter containing the solutions.

V.—Question (45), by Mr. JOHN CAM.—Suppose two bodies to fall at the same instant down two planes from a point in their intersection; it is required to find the position of the planes, so that at the end of a given time they may be at a given distance from each other in a vertical line.

Answered by Mr. RICHARD ABBATT.

Analysis.—Let C be the required point in the intersection of the two planes CD, CE; draw CA perpendicular CD, and CB perpendicular CE meeting the vertical line in A and B. Now,

since the times down CD, CE are equal, the times down AC, BC are equal. Describe the equilateral hyperbola HBH', having its vertex B, and axis AB, and by a property, it will be the locus of the point C. But, since the times down AC, CD are equal, the locus of C will likewise be a circle described on the diameter AD. Hence the intersections of the circle and hyperbola will furnish two points C, C', through either of which two planes CD, CE or C'D, C'E may pass, that will satisfy the conditions of the problem.



Mr. DUCKETT says,

Put $2a$ = the distance a body would fall vertically in the given time, $2b$ = the distance between them at the end of that time, θ the angle of inclination; then, by the nature of falling bodies,

we have $2a \cdot \sin^2 \theta = a \pm b$; therefore $\sin. \theta = \sqrt{\frac{a \pm b}{2a}}$ the

sine of the angle which either plane makes with the horizon.

VI.—Question (46), by Mr. HENRY CLAY.—AB is the diameter of a given circle, AC any chord, CD the right sine, CP perpendicular to AC and equal to CD. Required the quadrature of the curve which is the locus of P.

Answered by Mr. N. J. ANDREW, Penzance; and Mr. W. MITCHELL.

Draw the figure as per question.

Put $AB = a$ and $\angle ABP = \theta$.

Then, by trigonometry, $CB = a \cos. \theta$ and $AC = a \sin. \theta$; also by

similar triangles, $ACB, DCB, a : a$

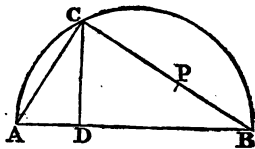
$\sin. \theta :: a \cos. \theta : CD = a \sin. \theta \cos. \theta$;

therefore, $BP = a(1 - \sin. \theta) \cos. \theta$.

When $\theta = 0^\circ$, $BP = a$; therefore

the curve commences at A; and when $\theta = 90^\circ$, $BP = 0$, which

indicates the curve passes through B.



Quadrature.— $\int \frac{1}{2} BP^2 d\theta = \frac{1}{2} a^2 \int (1 - \sin. \theta)^2 \cos.^2 \theta = \frac{1}{2} a^2 \int (1 - 2 \sin. \theta + 2 \sin.^3 \theta - \sin.^4 \theta), d\theta = \frac{1}{2} a^2 (\frac{1}{2} \theta + 2 \cos.$

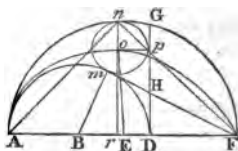
$\frac{1}{2}$

$\theta - 2 \sin.^2 \theta \cos. \theta - \frac{2}{3} \cos.^3 \theta + \frac{1}{3} \sin.^3 \theta \cos. \theta + \frac{2}{3} \sin. \theta \cos. \theta$), this when $\theta = 0^\circ = \frac{1}{3}a^2$; therefore, the correct area when $\theta = 90^\circ = .157542a^2$.

VII.—Question (47), by Mr. W. CLOUGH.—If GD be any sine of the given semicircle AGF, and on AD a semicircle be described within the former: it is required to find the quadrature of the curve whose locus is the centre of the circle described to touch the two semicircles, and also the sine on the same side that the less semicircle touches it.

Answered by the PROPOSER.

Suppose the circle described as in the annexed figure. If the line joining the centres E, o, be produced, it will pass through the point of contact n. Join o, p; then the points n, p, and F are in the same straight line, because $nE : EF :: no : op$. And since AnF , ADp are right angles,



$AF \times FD = nF \times Fp$; whence, if from m , the point of contact, a tangent be drawn, it will pass through the point F. Now,

put $AF = a$, $mF = x$; then $DF = \frac{x^2}{a}$, $AD = a - \frac{x^2}{a} = \frac{a^2 - x^2}{a}$,

and $mF = x : mB = \frac{a^2 - x^2}{2a} :: DF = \frac{x^2}{a} : DF = \frac{x(a^2 - x^2)}{2a^2}$;

whence $Dp = ro = \frac{x(a^2 - x^2)}{a^2}$. And since pD is known to be

a mean proportional between $2BD$ and $2op$, we have $2op = 2rD$
 $= pD^2 \div AD = \frac{x^2(a^2 - x^2)^2}{a^4} \div \frac{(a^2 - x^2)}{a} = \frac{x^2(a^2 - x^2)}{a^3}$,

and $rF = FD + rD = \frac{x^2}{a} + \frac{x^2(a^2 - x^2)}{2a^3} = \frac{x^2(3a^2 - x^2)}{2a^3}$.

Area $= \int rF \times or = \int \frac{x^2}{a^3} (3a^2 - x^2) \times \frac{x(a^2 - x^2)}{a^2} = \int \frac{x^5}{a^5}$

$(3a^4x^2 - 5a^2x^4 + 2x^6) = \frac{1}{a^5} \left(a^4x^3 - a^2x^5 + \frac{2x^7}{7} \right)$. When

$x = 0$, the curve begins, and this expression $= 0$; when $x = a$,

area $= \frac{2a^2}{7}$.

VIII.—Question (48), by COLLECTOR.—To find rational numerical values for the sides of any number of pairs of *different* isosceles triangles, all having the same perimeter, and each pair of triangles the same rational area.

Answered by Mr. W. WRIGHT, Hull.

Let a = perimeter, and x = one of the equal sides; then $a - 2x$ = base, and $\sqrt{a(x - \frac{1}{2}a)}$ = perpendicular, to make this last rational assume ap for its root; then $x = a(p^2 + \frac{1}{4})$; the base = $a(\frac{1}{2} - 2p^2)$, and area = $a^2p(\frac{1}{2} - 2p^2)$. Again, if y represent one of the equal sides, then, by a similar method, $y = a(q^2 + \frac{1}{4})$, and the area = $a^2q(\frac{1}{2} - q^2)$; hence, by the question, we immediately have $p(\frac{1}{2} - 2p^2) = q(\frac{1}{2} - 2q^2)$. This equality may be

resolved as follows: Assume $q = \frac{m}{n}p$, and we find, by a little

reduction, $p^2 = \frac{n^2(m-n)}{4(m^3-n^3)} = \frac{n^2}{4(m^2+mn+n^2)}$. To make this a square assume $m^2 + mn + n^2 = (m+n-t)^2$, and we shall have

$m = \frac{t(2n-t)}{n-2t}$, when n and t may be taken at pleasure, so as to

give p^2, q^2 , each less than $\frac{1}{4}$, as without this restriction the equation $p(\frac{1}{2} - 2p^2) = q(\frac{1}{2} - 2q^2)$ cannot hold good.

Example 1.—If $t = n - 2t$, $t = \frac{1}{3}n$, and $m = \frac{5n}{3}$. If $n = 3$,

then $m = 5$, $p = \frac{3}{14}$, $q = \frac{5}{14}$; then $x = \frac{29a}{98}$, and $y = \frac{37a}{98}$.

Example 2.—If $n = 4$, $t = 1$, then $m = \frac{7}{2}$, $p = \frac{4}{13}$, $q = \frac{7}{26}$.

$x = \frac{233a}{676}$, $y = \frac{109a}{338}$.

Again, by Mr. JOHN BAINES.

Put $p^2 + r^2$ and $2(p^2 - r^2)$ = one of the equal sides and base of one triangle, and $p^2 + s^2$ and $2(p^2 - s^2)$ = one of the equal sides and base of the other, of one pair; then the perimeter of each = $4p^2$, perpendicular of 1st = $2pr$, its area = $2pr(p^2 - r^2)$; perpendicular $2d = 2ps$, its area = $2ps(p^2 - s^2)$; hence $2ps(p^2 - s^2)$

= $2pr(p^2 - r^2)$, or $p^2 = \frac{r^3 - s^3}{r - s} = r^2 + rs + s^2$, which gives

$r = \frac{1}{2}(\sqrt{(4p^2 - 3s^2)} - s)$. To make $\sqrt{(4p^2 - 3s^2)}$ rational, put its root $= 2p - \frac{ms}{n}$, which gives $s = p \cdot \frac{4mn}{m^2 + 3n^2}$, and consequently $r = p \cdot \frac{-m^2 - 2mn + 3n^2}{m^2 + 3n^2}$. From this result it is ma-

nifest that, by giving different values to m and n , any number of pair of isosceles triangles will be found, answering the condition of the question.

Example 1.—If $m = 1$, and $n = 3$, $s = \frac{3}{7}p$, $r = \frac{5}{7}p$, the equal side and base of one triangle $= \frac{74}{49}p^2$ and $\frac{48}{49}p^2$, of the other $= \frac{58}{49}p^2$ and $\frac{80}{49}p^2$, and the area of each $= \frac{240}{343}p^4$.

Example 2.—If $m = 1$, and $n = 2$, $s = \frac{8}{13}p$, $r = \frac{7}{13}p$, the side and base of one triangle $= \frac{218}{169}p^2$ and $\frac{240}{169}p^2$, and of the other $= \frac{233}{169}p^2$ and $\frac{210}{169}p^2$, the area of each being $= \frac{1680}{2197}p^4$, &c. &c., the perimeter of them all being the same, viz. $4p^2$.

Mr. THOMAS HOGAN says,

Put $2p$ = perimeter, and a = area, $2x$ = base of one triangle, and $2mx$ = base of the other; then $p - x$, and $p - mx$ = a side of each respectively, and their areas are $(p^2 - 2px)^{\frac{1}{2}}x$ and $(p^2 - 2pmx)^{\frac{1}{2}}mx$; hence we have $(p^2 - 2px)^{\frac{1}{2}}x + (p^2 - 2pmx)^{\frac{1}{2}}mx = a$, from which we can find x .

IX.—Question (49), by COLLECTOR.—Suppose a given hemisphere and right cylinder to stand upon the same plane, with their superficies intersecting each other; it is required to find the equation of the curve which is the locus of that intersection, the distance of the centres of the hemisphere and base of the cylinder being given.

Answered by Mr. GRIFFITH JONES, Liverpool, and Mr. T. HOGAN, Mathematical Master at the Rev. Dr. Hulse's, Sion Hill, Bath.

Let the origin of the co-ordinates x, y , and z , be at the centre of the sphere; also the axis of the cylinder in the plane of xz . Put R = radius of the sphere, r = that of the cylinder, a = the distance between their centres; hence $x^2 + y^2 + z^2 = R^2$ the equation of the sphere, and $(x - a)^2 + y^2 = r^2$ the equation of the cylinder; therefore, by deducting the latter from the former, we shall have $2ax + z^2 = R^2 - r^2 + a^2$; or by assuming $m^2 = R^2 - r^2 + a^2$, we have $z^2 = m^2 - 2ax$, the equation of the curve on the plane of xz . Again, $x = \sqrt{r^2 - y^2} + a$ or $x^2 = r^2 - y^2 + 2a\sqrt{r^2 - y^2} + a^2 =$ (from the equation to the sphere) $R^2 - y^2 - z^2$; hence $z^2 + 2a\sqrt{r^2 - y^2} = R^2 - r^2 - a^2$; or by assuming $n^2 = R^2 - r^2 - a^2$, we shall have $z^2 = n^2 - 2a\sqrt{r^2 - y^2}$ the equation of the curve on the plane of yz .

Remark.—Should the centre of the base of the cylinder bisect the radius of the sphere, we should have $a = r = \frac{R}{2}$; hence

$$z^2 = R(R - x) = R\left(\frac{R}{2} - \sqrt{\left(\frac{R}{4} - y^2\right)}\right).$$

X.—Question (50), by Mr. JONATHAN DRYDEN.—Suppose the frustum of an oblong pyramid stands with its smaller end upon two blocks, one at each side, that make an angle ϕ with the horizon, the length and width of the bottom being m and n , that of the top a and b , and its height h ; to determine the content of the part pressing each block.

Answered by Mr. J. BAINES.

The blocks making angles with the horizon may be considered as inclined planes, and hence the angle formed by them where they meet is $90 - \phi$. Now, the content of the block is $\frac{1}{6}h(2ab + 2mn + an + bm)$; and the solidities of bodies being as their weights, we have (*Marrat's Mechanical Arts*, 198) $\sin. (90 - \phi)$: solidity :: $\sin. \phi$: $\frac{1}{6}h \text{ tang. } \phi \times (2ab + 2mn + an + bm) =$ the content of the part pressing each block.

XI.—Question (51), by Mr. GEORGE DUCKETT.—Suppose a flexible chain 40 inches long, 30 inches of which be laid straight on a horizontal table perpendicular to the edge, the rest hanging freely down and left to descend; required the final velocities of the chain, and times of quitting the table, first when the friction is a fourth of the weight of that part on the table, secondly when there is no friction.

Answered by the PROPOSER, and Mr. N. J. ANDREW, Penzance.

Put a = length of the chain = 40 inches, g = force of gravity = 193 inches, x = that part of the chain descending, ϕ = the accelerative force, t = the time, and v the velocity. Now, I conceive the friction to be the same as the chain drawn up a smooth inclined plane whose length is four times its height. By the principles of motion, we have the equations, $\phi dt = dv$, and $v dt = dx$; therefore $v dv = \phi dx$; hence $v^2 = 2 \int \phi dx$, and $\phi = \frac{2g}{a}$.

$\left(x - \frac{a-x}{4}\right) - \frac{g}{2a} \cdot (5x-a)$; therefore $2 \int \phi dx = \frac{g}{a} \int (5x-a) dx = \frac{g}{2a} (5x^2 - 2ax) = v^2$; but when $x = \frac{1}{5}a$, $v = 0$; therefore

$$v = \sqrt{\frac{g}{2a} \cdot (5x^2 - 2ax + \frac{1}{5}a^2)} = \frac{1}{5} \sqrt{g \cdot (x^2 - 16x + 60)},$$

and when $x = a = 40$, then $v = \frac{1}{5} \sqrt{255g} = 110.9$ inches per second, the final velocity in the first case. Again $dt = \frac{dx}{v} = \frac{4}{\sqrt{g}}$.

$$\frac{dx}{\sqrt{x^2 - 16x + 60}}, \text{ and } t = \frac{4}{\sqrt{g}} \times \text{hyp. log. } \frac{x-8 + \sqrt{x^2 - 16x + 60}}{2}$$

$$= (\text{when } x = 40) \frac{4}{\sqrt{g}} \cdot \text{hyp. log. } (16 + \sqrt{255}) = .994666 \text{ of a}$$

second, nearly 1". In the second case, we have $\phi = 2g \cdot \frac{x}{a}$, or

$$\phi dx = 2g \frac{x dx}{a} = v dv; \text{ therefore } v^2 = 2g \cdot \frac{x^2}{a} + c = 2g \cdot$$

$$\left(\frac{x^2}{a} - \frac{1}{5}a\right), \text{ or } v = \sqrt{\left(\frac{2g}{a} \cdot (x^2 - 100)\right)} = (\text{when } x = a)$$

$5\sqrt{3g} = 120.312$ inches, the velocity per second. Again, $dt =$

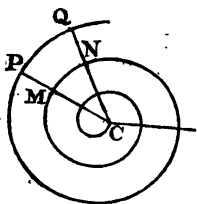
$$\frac{dx}{v} = \sqrt{\frac{a}{2g}} \cdot \frac{dx}{\sqrt{x^2 - 100}}; \text{ therefore } t = \sqrt{\frac{a}{2g}} \cdot \text{hyp. log.}$$

$$\frac{x + \sqrt{x^2 - 100}}{10} = (\text{when } x = a) \sqrt{\frac{a}{2g}} \cdot \text{hyp. log. } (4 + \sqrt{15}) =$$

.606 of a second = $0''\frac{2}{3}$, the time required.

XII.—Question (52), by Mr. CHARLES GILL.—PQ, MN are segments of two adjacent spires of the spiral of Archimedes; CMP, CNQ two radii vectores from the centre C. Given the two segments NQ, MP of these lines, and the difference of CN, CM, together with the area of the trapezoidal space MPQN; to find the angle contained between CP, CQ, and the two segments PQ, MN.

Answered by the PROPOSER.



The general equation of this curve is $v = \frac{a}{\pi} \phi$; where $a =$ a constant line, ϕ is the angle contained between a and v , and $\pi =$ the periphery of $a \odot$ rad. l. Now, if $CM = \frac{a}{\pi} (n\pi + \phi)$, $CP = \frac{a}{\pi} (n + 1\pi + \phi)$; therefore $PM =$

$CP - CM = \frac{a}{\pi} \cdot \pi = a$, which is given, per question, and which, being constant, must necessarily $= QN$. Moreover, if $CM = \frac{a}{\pi} (n\pi + \phi)$ and $CN = \frac{a}{\pi} (n\pi + \phi + MCN)$, then $CN - CM = \frac{a}{\pi} \cdot MCN =$ a given line $= b$; therefore $MCN = \pi \cdot \frac{b}{a}$, the angle required.

Again, the area $= \frac{1}{2} \int v^2 d\phi = \frac{\pi}{2a} \int v^2 dv = \frac{\pi}{6a} \cdot v^3$. This, between $v = y$ and $v = v_2$ (putting $CM = v_1$ and $CN = v_2$), gives the area $MCN = \frac{\pi}{6} (v_2^3 - v_1^3)$; and let $v = v_1 + a dv = v_2 + a$, area $PCQ = \frac{\pi}{6a} (v_2^3 + a^3 - v_1^3 + a^3)$; therefore $MPQN = \frac{\pi}{6a} \{ v_2^3 + a^3 - (v_1^3 + a^3) - v_2^3 + v_1^3 \} = \frac{1}{2} \pi (v_2 - v_1) (v_2 + v_1 + a) = \frac{1}{2} \pi b (v_2 + v_1 + a) = A$, therefore $v_2 + v_1 = \frac{2A}{\pi b} - a$, and

$v_2 - v_1 = b$; therefore $v_2 = \frac{A}{\pi b} + \frac{1}{2}b - \frac{1}{2}a$, and $v_1 = \frac{A}{\pi b} - \frac{1}{2}b - \frac{1}{2}a$, in functions of known quantities.

Also the length of the curve, in general, $= \int \sqrt{v^2 d\phi^2 + dv^2}$
 $= \int dv \sqrt{\frac{\pi^2}{a^2} v^2 + 1} = \frac{1}{2} v \sqrt{\frac{\pi^2}{a^2} v^2 + 1} + \frac{a}{2\pi} \text{hyp. log.} \left\{ \frac{\pi}{a} v + \sqrt{\frac{\pi^2}{a^2} v^2 + 1} \right\}$, which, between the above limits, gives $MN =$
 $\frac{1}{2} v_2 \sqrt{\frac{\pi^2}{a^2} v_2^2 + 1} - \frac{1}{2} v_1 \sqrt{\frac{\pi^2}{a^2} v_1^2 + 1} + \frac{a}{2\pi} \log \frac{\pi v_2 + \sqrt{\pi^2 v_2^2 + a^2}}{\pi v_1 + \sqrt{\pi^2 v_1^2 + a^2}}$.

and $PQ = \frac{1}{2}(v_2 + a) \sqrt{\frac{\pi^2}{a^2}(v_2 + a)^2 + 1} - \frac{1}{2}(v_1 + a) \sqrt{\frac{\pi^2}{a^2}(v_1 + a)^2 + 1}$
 $+ \frac{a}{2\pi} \cdot \log \frac{\pi(v_2 + a) + \sqrt{\pi^2(v_2 + a)^2 + a^2}}{\pi(v_1 + a) + \sqrt{\pi^2(v_1 + a)^2 + a^2}}$, wherein the above

values of v_1 and v_2 are to be substituted.

Cor.—Any radius vector of this curve is divided into equal parts by the spires which cut it.

XIII.—Question (53), by Mr. THOMAS HOGAN.—Having given two distances of a comet in its parabolic orbit from the sun, and the angle included, investigate this proportion for determining the perihelion (which is here supposed to lie between those distances). The sum of the square roots of the distances is to the difference as the cotangent of the semi-sum of half the true anomalies to the tangent of the semi-difference of the same.

Answered by Mr. J. BAINES.

The polar equation to the parabola, which is easily deduced from $y^2 = 4ax$, is $\rho = \frac{a}{\cos^2 \frac{\theta}{2}}$. Hence, supposing θ, θ' the true

anomalies corresponding to the distances ρ, ρ' , we have $\rho : \rho' ::$
 $\frac{a}{\cos^2 \frac{\theta}{2}} : \frac{a}{\cos^2 \frac{\theta'}{2}}$, or $\sqrt{\rho} : \sqrt{\rho'} :: \cos \frac{\theta'}{2} : \cos \frac{\theta}{2}$. By addition

and subtraction, $\sqrt{e} + \sqrt{e'} : \sqrt{e} - \sqrt{e'} :: \cos. \frac{\theta}{2} + \cos. \frac{\theta}{2} : \cos. \frac{\theta'}{2} - \cos. \frac{\theta}{2} :: 2 \cos. \frac{\theta + \theta'}{2} \cos. \frac{\theta - \theta'}{2} : 2 \sin. \frac{\theta + \theta}{2} \sin. \frac{\theta - \theta'}{2} :: \cot. \frac{\theta + \theta'}{2} : \tan. \frac{\theta - \theta'}{2}$. Q.E.D.

Mr. MITCHELL says an answer to this Question may be seen in *Vince's Astronomy*.

XIV.—Question (54), by Mr. GRIFFITH JONES.—A cylinder of given dimensions, containing air of a given density, being placed in water at a given distance below the surface, and an orifice of a given area being made in the bottom; required the quantity in the cylinder when the motion ceases, also the quantity when the velocity at the orifice is given, and the time of filling, the axis of the cylinder being supposed vertical.

Answered by the PROPOSER.

Let δ = density of the air in the cylinder at the beginning of motion, D = that of water, h = the height of the homogenous atmosphere, r = radius of the cylinder, $\pi = 3.1416$, $g = 32\frac{1}{2}$, a = altitude of the surface of the water above the orifice, H = height of the cylinder, V = velocity of water rushing into a vacuum, v = velo, at any other stage of filling; then we shall have $V = \sqrt{2ga}$ with a moving force, $m = \delta h + Da$, and when the water has arisen to any height (x) within the cylinder, the moving force m' will

$$\text{be} = \delta h + Da - \frac{\pi r^2 H \times \delta h}{\pi r^2 (H - x)} = \frac{Da h - \delta h x - a D x}{H - x}. \text{ But } m'$$

is as the square of the velocity; hence $v = \sqrt{\frac{m'}{m}} =$

$$\left(\frac{2ga \times DaH - \delta h x - Da x}{(\delta h + Da) \times H - x} \right)^{\frac{1}{2}}. \text{ Assume } x = 0, \text{ then at first the}$$

water rushes into the cylinder with a velocity $v = \left(\frac{2ga \times DaH}{\delta h + Da \times H} \right)^{\frac{1}{2}}$

$$= \left(\frac{2ga^2 D}{\delta h + Da} \right)^{\frac{1}{2}}. \text{ But when } v \text{ is } = 0, \text{ therefore } DaH - \delta h x -$$

$$Da x = 0; \text{ hence } x = \frac{DaH}{\delta h + Da}.$$

Again, v being given $= b$ (suppose) $b^2 = 2ga \times \left(\frac{DaH - nx - Dax}{bh + Da \times H - x} \right) = (\text{if } bh + Da \text{ be } = n) 2ga \times \left(\frac{DaH - nx}{nH - nx} \right)$. From this equation we find $x = \frac{2ga \times DaH - nb^2H}{2gan - nb^2}$, the height required.

Put $A = \pi r^2$, $B =$ area of the orifice, $t =$ time, and $p = \frac{DaH}{n}$; hence $v = \sqrt{2ga} \left(\frac{p - x}{H - x} \right)^{\frac{1}{2}}$. But $Bvdt = Adx$, or $dt = \frac{Adx}{Bv} = \frac{A}{\sqrt{2ga}} \times dx \left(\frac{H - x}{p - x} \right)^{\frac{1}{2}}$, whose integral may be found by consulting *Vince's Fluxions*, art. 148.

Again, by Mr. N. J. ANDREW.

Suppose a to denote the height of a column of water equal to the weight of the atmosphere, $d =$ the given density of the water in the cylinder, $h =$ the distance of the orifice from the surface of the water, $b =$ the length of the cylinder, $A =$ the area of the cylinder's base divided by that of the orifice, $g = 32\frac{1}{2}$, and suppose that at the end of any time t , the water has risen to the height x in the cylinder; then the whole force at the orifice urging the water upwards $= a + h$; and from the principles of pneumatics, the elastic force of the compressed air is equal to the pressure of

a column of water whose height is $a \frac{dl}{l - x}$; therefore the whole

force opposing the water's ascent $= x + a \frac{dl}{l - x}$; hence, when

the motion ceases, $a + h = x + a \frac{dl}{l - x}$, where x is obtained

from a quadratic equation, and then the quantity of water in the cylinder. Again, the velocity of the water at the orifice is such as would be generated by the pressure of a column of water

whose height $= a + h - x - a \frac{dl}{l - x}$; therefore $v =$

$\sqrt{\left\{ 2g \left(a + h - x - a \frac{dl}{l - x} \right) \right\}}$, which determines x when v is given; and consequently the quantity of water then in the

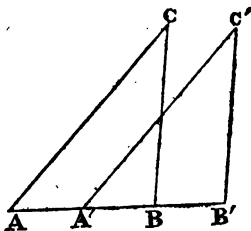
cylinder. To find the time, we have, $t = \frac{Ax}{v} = Ax$

$\sqrt{\left(\frac{l-x}{b-cx+x^2}\right)}$, where b and c are functions of the given quantities. Hence t may be had in terms of x by an infinite series.

XV.—Question (55), by Mr. GRIFFITH JONES.—A rod of given weight (w), which passes through two small rings fixed in the same vertical line, by its pressure puts in motion along a smooth horizontal, a solid inclined plane of given weight (q), length of the latter being 100 inches, and altitude 36 inches. Suppose the point of contact of the rod and plane at the commencement of motion to be infinitely near the top of the latter; required the time in which the plane quits the rod.

Answered by the PROPOSER.

Let ABC represent a vertical section of the inclined plane in its first position, $A'C'B'$ that of any other. Put $b = AB$, $a = BC$, $v =$ velocity of the rod, $u =$ that of the inclined plane, $g = 32\frac{1}{2}$, $t =$ the time, $x = AA' = BB'$. Then the only moving force is (w), and the inertia of (q) to retard the motion of (w) is $= \frac{qb^2}{a^2}$; hence the accelerating



force on $w = \frac{a^2w}{a^2w + b^2q}$, and that on $q = \frac{b}{a} \times \frac{a^2w}{a^2w + b^2q} = \frac{baw}{a^2w + b^2q}$; hence $udu = \frac{gbawdx}{a^2w + b^2q}$, whose integral is $u^2 = \frac{2gbawx}{a^2w + b^2q}$, which wants no correction; or $u = \left(\frac{2abgw x}{a^2w + b^2q}\right)^{\frac{1}{2}}$. Assume $m = \left(\frac{2abgw}{a^2w + b^2q}\right)^{\frac{1}{2}}$; hence $u = mx^{\frac{1}{2}}$, consequently $dt = \frac{dx}{u} = \frac{dx}{mx^{\frac{1}{2}}}$, whose integral is $t = \frac{2\sqrt{x}}{m} = \frac{2b^{\frac{1}{2}}}{m} = \frac{\sqrt{2a^2w + 2b^2q}}{\sqrt{mag}}$ = the time required.

Remark.—The velocity of the plane on quitting the rod, is $= b \frac{\sqrt{2ugm}}{\sqrt{(u^2w + b^2q)}}$. Assume $a = b$; hence $u = \frac{\sqrt{2gmw}}{w+q}$, and

$$-\frac{2 \sec.^2 \theta}{\sec. \theta + 1} = a, \text{ or } x = \frac{a}{\frac{1}{\frac{1}{2} \sin. \theta} - \frac{2 \sec. \theta}{\sec. \theta + 1}}, \text{ which deter-}$$

mines the paraboloid, the time of emptying which is easily found, which, added to the time when the observation was made, gives the time of the day when it will be completely empty.

Mr. Jonathan Dryden also sent a good answer to this question.

XVII.—Question (57). by Mr. DAVID ROBERTS.—Suppose two perforations made through the earth, one at the equator and another at the pole, meeting and intersecting one another at the centre, and a heavy body be let fall from the surface into each at the same moment of time, what would be the difference between the times of their returns to the points from whence they were let fall, supposing the equatorial diameter of the earth to exceed the polar by 26 miles, the former being estimated at 7934 miles?

Answered by Mr. DUCKETT, of Liverpool; Mr. KNIVETON; and Mr. OAKES.

Let the earth's diameter and axis be $2r$ and $2r'$, x = any distances the bodies have descended in the times t and t' , and to make the question the most simple, suppose 32 feet to be the measure of gravity at the surface, both at the equator and pole; then we

have $\frac{d^2x}{dt^2} = \frac{r-x}{r} \cdot 32$. Multiply by $2dx$ and integrate, and

$\frac{dx^2}{dt^2} = \frac{2rx-x^2}{r} \cdot 32$; therefore, $dt = \frac{\sqrt{r}}{4\sqrt{2}} \cdot \frac{dx}{\sqrt{2rx-x^2}}$; hence

$t = \frac{\sqrt{r}}{4\sqrt{2}} \times$ circumscribing circle radius 1, ver. sin. $\frac{x}{r}$, and for the

whole time = $\frac{\sqrt{r}}{\sqrt{2}} \cdot \frac{\pi}{2}$ (π = semiperimeter to radius 1); therefore,

$\frac{r^{\frac{1}{2}} - r'^{\frac{1}{2}}}{\sqrt{2}} \cdot \frac{\pi}{2} = t - t' = 6.32375$ seconds, the difference of time,

as required.

Similar to this were the answers sent by Messrs. Temple and Dryden.

Again, by Mr. ANDREW, and Mr. MITCHELL.

Let r and r' respectively denote the equatorial and polar semidiameters g , and g' the respective forces of gravity at the equator

and the pole, $\pi = 3.1416$; and suppose the body let fall from the equator to have passed through any space, x , at the end of t time,

then, by the laws of gravity, $r : r - x :: g : \frac{g}{r} (r - x)$ = the acce-

lating force; therefore, $v\dot{v} = \frac{g}{r} (r - x)\dot{x}$, and $v = \sqrt{\frac{g}{r}(2rx$

$- x^2)$; consequently $t = \int \sqrt{\frac{r}{g}} \left(\frac{\dot{x}}{\sqrt{(2rx - x^2)}} \right) = \sqrt{\frac{1}{rg}} \times$

circular arc to versed sine x , and radius r , which, when $x = r$,

gives $\frac{1}{2}\pi\sqrt{\frac{r}{g}}$ for the time of falling through r . Also by a similar

process, the time of falling through $r' = \frac{1}{2}\pi\sqrt{\frac{r'}{g'}}$. Again, the force

of gravity in latitude $L = g(1 + 005284 \sin.^2 L)$ (see *Hutton's Dictionary* art. Gravity.) Hence, supposing the force of gravity

at London $= 32\frac{1}{8}$, we obtain $g = 32.06343$, and $g' = 32.23272$;

therefore, the time sought $= 2\pi \left\{ \sqrt{\frac{r}{g}} - \sqrt{\frac{r'}{g'}} \right\} = 21.55032$ seconds.

XVIII.—Question (58), by Mr. THOMAS TODD.—I am persuaded, though many good rules have already been given to determine the solidity of a conic frustum, that one superior to any of them, when tables of circular areas are used, can yet be discovered; such a one, therefore, is here required.

Answered by Mr. BAINES.

Putting D, d = the diameters, and h = the height of the frustum. Take $\frac{1}{2}$ of the area corresponding to a diameter $= D + \frac{1}{2}d$, and $\frac{1}{2}$ of that corresponding to d . Multiply the sum by h , and the product will be the solidity. For $\frac{1}{2} \left(D + \frac{d}{2} \right)^2 + \frac{1}{2}d^2 = \frac{1}{2}(D^2 + Dd + d^2)$, and $.7854 (D^2 + Dd + d^2) \times \frac{1}{2}h$ = the solidity, which is the same as the rule.

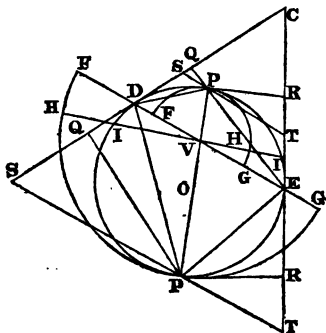
Again by Mr. HOGAN.

By adverting to Question 39, proposed by Mr. P. Nicholson in No. 21 of the *Mathematical Companion*, and solved by Mr. Gompertz in the subsequent Companion, a commodious and general expression will be found, not only for the solidity of a conic frustum, but for the solidity of a wedge, the frustum of a pyramid, &c.

XIX.—Question (59), by Mr. WILLIAM WRIGHT—CD, CE are tangents to the given circle DEPP. Find, *geometrically*, the points P, P in the circle, so that if perpendiculars PR, PQ be demitted upon CD, CE, the sum of mPR and nPQ shall be a maximum or minimum.

Answered by the PROPOSER.

Analysis.—Suppose P, P, having the maximum and minimum properties, are determined, through each of these points draw $ST \parallel DE$ meeting the tangents at S, T; draw PD, PE. Now, by the circle $CD = CE$, *ergo* by parallels $CS = CT$, and the $\angle PSQ = \angle PTR = \frac{1}{2}$ sup. of the $\angle C$; *ergo* $PS : PQ$ and $PT : PR$ have the same given ratios; consequently when $mPR + nPQ$ is a maximum or minimum $mPS + nPT$ is a maximum or minimum. But by the circle, $\angle PET = \angle PDE$; and by parallels, $\angle EPT = \angle DEP$; hence the triangles PET, EDP, are similar, and $PT : PE :: PE : DE$; or $mPT \times DE = mPE^2$. In like manner the triangles PDS, EDP, are similar, and $nPS \times DE = nPD^2$; hence $(mPT + nPS) \times DE = mPE^2 + nPD^2$; but DE being given, and $mPT + nPS$ being a maximum or minimum, it follows that $mPE^2 + nPD^2$ must be a maximum or minimum. Now divide DE at V so that $DE : EV :: n : m$; then by the lemma on page 374 *Leslie's Geometry*, 1st edit. $mPE^2 + nPD^2 = mDE \times EV + (m + n)VP^2$, which must be a maximum or minimum; but DE and EV are given lines; *ergo*, VP must be a maximum or minimum, which is the case when VP passes through O the centre of the given circle, for to radii VP, VP, describe semicircles which will touch the given circle at P, P, and draw a right line VIH meeting the circle at I, I, and the semicircles at H, H; then in one case VI is less than VH = VP, and in the other greater than VH = VP; consequently P, P, are the required points, and are in a right line with O the centre of the circle.



Good solutions were also sent by Messrs. Duckett and Hogan.

XX.—PRIZE QUESTION (60), by Mr. W. S. B. WOOLHOUSE.—

The nature of n different functions, $\phi_1(x_1, x_2, x_3 \dots x_n)$, $\phi_2(x_1, x_2, x_3 \dots x_n)$, $\phi_3(x_1, x_2, x_3 \dots x_n)$, &c. $\dots \phi_n(x_1, x_2, x_3 \dots x_n)$, of n independent values x_1, x_2, x_3 , &c. $\dots x_n$ are given. It is required to give a method of ascertaining whether or not a dependency exists amongst them.

Answered by the PROPOSER.

Let $\phi_1(x_1, x_2, x_3 \dots x_n) = u_1$; $\phi_2(x_1, x_2, x_3 \dots x_n) = u_2$; $\phi_3(x_1, x_2, x_3 \dots x_n) = u_3$, &c. &c. $\dots \phi_n(x_1, x_2, x_3 \dots x_n) = u_n$; and, supposing a dependency to exist among u_1, u_2, u_3 , &c. $\dots u_n$, let it be denoted by $f(u_1, u_2, u_3 \dots u_n) = 0$, or, for the sake of simplicity, $f = 0$. Then, by differentiating,

$$df = \left(\frac{df}{du_1}\right)du_1 + \left(\frac{df}{du_2}\right)du_2 + \left(\frac{df}{du_3}\right)du_3 \dots + \left(\frac{df}{du_n}\right)du_n = 0.$$

Assume $\frac{df}{du_1} = \psi_1$, $\frac{df}{du_2} = \psi_2$, $\frac{df}{du_3} = \psi_3 \dots \frac{df}{du_n} = \psi_n$, where $\psi_1, \psi_2, \psi_3 \dots \psi_n$ are certain functions of $u_1, u_2, u_3 \dots u_n$ dependent on the nature of f . We hence have

$$\psi_1 du_1 + \psi_2 du_2 + \psi_3 du_3 \dots + \psi_n du_n = 0.$$

But

$$du_1 = \left(\frac{du_1}{dx_1}\right)dx_1 + \left(\frac{du_1}{dx_2}\right)dx_2 + \left(\frac{du_1}{dx_3}\right)dx_3 \dots + \left(\frac{du_1}{dx_n}\right)dx_n;$$

$$du_2 = \left(\frac{du_2}{dx_1}\right)dx_1 + \left(\frac{du_2}{dx_2}\right)dx_2 + \left(\frac{du_2}{dx_3}\right)dx_3 \dots + \left(\frac{du_2}{dx_n}\right)dx_n;$$

$$du_3 = \left(\frac{du_3}{dx_1}\right)dx_1 + \left(\frac{du_3}{dx_2}\right)dx_2 + \left(\frac{du_3}{dx_3}\right)dx_3 \dots + \left(\frac{du_3}{dx_n}\right)dx_n$$

$$\text{\&c.} \quad \text{\&c.} \quad \text{\&c.} \quad \text{\&c.} \quad \text{\&c.}$$

$$du_n = \left(\frac{du_n}{dx_1}\right)dx_1 + \left(\frac{du_n}{dx_2}\right)dx_2 + \left(\frac{du_n}{dx_3}\right)dx_3 \dots + \left(\frac{du_n}{dx_n}\right)dx_n$$

Therefore, by substitution,

$$\left\{ \frac{du_1}{dx_1} \psi_1 + \frac{du_2}{dx_1} \psi_2 + \frac{du_3}{dx_1} \psi_3 \dots + \frac{du_n}{dx_1} \psi_n \right\} dx_1$$

$$\begin{aligned}
& + \left\{ \frac{du_1}{dx_2} \psi_1 + \frac{du_2}{dx_2} \psi_2 + \frac{du_n}{dx_2} \psi_3 \dots + \frac{du_3}{dx_2} \psi_n \right\} dx_2 \\
& + \left\{ \frac{du_1}{dx_3} \psi_1 + \frac{du_2}{dx_3} \psi_2 + \frac{du_3}{dx_3} \psi_3 \dots + \frac{du_n}{dx_3} \psi_n \right\} dx_3 \\
& \quad \&c. \quad \quad \&c. \quad \quad \&c. \quad \quad \&c. \\
& + \left\{ \frac{du_1}{dx_n} \psi_1 + \frac{du_2}{dx_n} \psi_2 + \frac{du_3}{dx_n} \psi_3 \dots + \frac{du_n}{dx_n} \psi_n \right\} dx_n = 0.
\end{aligned}$$

But since the values of $x_1, x_2, x_3 \dots x_n$ are entirely independent, their differentials $dx_1, dx_2, dx_3 \dots dx_n$ must also be independent; and consequently their several coefficients must be separately equal to zero. Hence, dividing each by ψ_1 , we have

$$\frac{du_1}{dx_1} + \frac{du_2}{dx_1} \cdot \frac{\psi_2}{\psi_1} + \frac{du_3}{dx_1} \cdot \frac{\psi_3}{\psi_1} \dots + \frac{du_n}{dx_1} \cdot \frac{\psi_n}{\psi_1} = 0 \dots (1)$$

$$\frac{du_1}{dx_2} + \frac{du_2}{dx_2} \cdot \frac{\psi_2}{\psi_1} + \frac{du_3}{dx_2} \cdot \frac{\psi_3}{\psi_1} \dots + \frac{du_n}{dx_2} \cdot \frac{\psi_n}{\psi_1} = 0 \dots (2)$$

$$\frac{du_1}{dx_3} + \frac{du_2}{dx_3} \cdot \frac{\psi_2}{\psi_1} + \frac{du_3}{dx_3} \cdot \frac{\psi_3}{\psi_1} \dots + \frac{du_n}{dx_3} \cdot \frac{\psi_n}{\psi_1} = 0 \dots (3)$$

&c. &c. &c. &c.

$$\frac{du_1}{dx_n} + \frac{du_2}{dx_n} \cdot \frac{\psi_2}{\psi_1} + \frac{du_3}{dx_n} \cdot \frac{\psi_3}{\psi_1} \dots + \frac{du_n}{dx_n} \cdot \frac{\psi_n}{\psi_1} = 0 \dots (n)$$

Eliminating from these n equations the $n - 1$ values $\frac{\psi_2}{\psi_1}, \frac{\psi_3}{\psi_1}, \frac{\psi_4}{\psi_1} \dots$

$\frac{\psi_n}{\psi_1}$, we finally deduce an equation in which substituting the values of

the partial differential coefficients, $\frac{du_1}{dx_1}$, &c. the result ought obviously to

vanish; under which circumstance it would necessarily follow that the functions $u_1, u_2, u_3 \dots u_n$ are dependent throughout each other, as we have at first assumed; but should the result not vanish, it will be an evident indication that the proposed functions are entirely independent.

*List of Persons who Contributed the Enigmas, &c. &c. in the
ENIGMATICAL ENTERTAINER.*

NAMES.	1828.					1829.					1830.				
	E.	C.	R.	A.	Q.	E.	C.	R.	A.	Q.	E.	C.	R.	A.	Q.
ARGOTHP - - -	10														
Baines, John - - -						1	1	1	1	1,2,3,4	1	1	1	1	1
Baty, John - - -	1			1	5								2	2	
C. N. - - -		5			9		3			9		8			
Clay, Henry - - -	2	1,2,3	1	2,5	10, 11	2	2		2						
Clay, Mrs. Sarah - - -	3	4													
Clay, Mrs. Clara - - -	4														
Crossley, Thos. - - -						3	4	3	3						
Enigmaticus - - -						4			4	5					2
Gill, Charles - - -						5					2				
Gill, Mrs. Charles - - -						6									
Gove, Philip - - -	5														
Harrison, William - - -											2	3		3	
Herdson, John - - -	9		3		7	7		5	6		3	4		4	
Hetherington, John - - -	7		2												
Highland Lassie - - -	6										3				
Hood, James - - -					6										
Hope, John - - -	8	6	4	3,4	3	Pr.	5	4	5	6,7	5	4		3	6
Hogan, Thomas - - -															5
Holt, Charles - - -											4				
Hutchinson, W. - - -						8	6	6,7							
Jerwood, James - - -					1,2										
J. E. B. - - -								2							
King, Perci - - -	11		5			9	7			8	6	5	5		7
Lester, William - - -	12	7	6	6							7	6	6	4	
Middlemist, Robert - - -															
M. M. - - -					8										
Ord, L. - - -											8	7			
Paxton, Matthew - - -		8	7						7		9				
R---, Rev. W. - - -					4										
Richardson, Mrs. - - -						14									
Richardson, Miss C. C. - - -	13			9							Pr				
Richardson, Miss E. A. - - -	14			8		10	8				11				
Richardson, Miss E. - - -	15			7											
Richardson, John - - -						12		8	8		10				
Robarts, David - - -	16	9	8	10	12	11		9	9	10	12		7	5	
Robarts, Miss Betsy - - -												9			
Roberts, Thomas - - -						13									
Sheridan, D. T. - - -	17	10	9								13		8		8
Smart, T. R. - - -	Pr.					15					14	10	9	6	
Starmer, George - - -		11							10						
Tholoby, Walter - - -											15				
Waverton, Miss W. - - -						16					16				
Whicker, Thomas - - -	18					18					17				
Wilmot, Noah - - -	19	12	10			17					18	11			
Witton, William - - -							9, 10								
Yewdall, John - - -						19					19		10		

N.B. It is deemed unnecessary to give a List of the Answers of the above, as they may be found in the respective Numbers.

A List of the Mathematical Contributors, and the Questions answered by each.

Abbatt, Richard	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 14, 15, 16, 17, 18.
Andrew, N. J.	1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 13, 14, 15, 17.
Baines, John	1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 13, 14, 17, 18, 19.
Clough, William	7.
Dryden, Jonathan.....	1, 2, 3, 4, 5, 6, 9, 10, 11, 12, 13, 14, 15, 16, 17.
Duckett, George	4, 5, 6, 7, 9, 10, 11, 13, 14, 15, 17, 18, 19.
Gill, Charles	12.
Harrison, William.....	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 16, 17, 18, 19.
Hogan, Thomas.....	1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 13, 18, 19.
Jones, Griffith	9, 11, 14, 15.
Kniveton, Samuel	1, 2, 5, 17.
Mitchell, William.....	1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19.
Oakes, William....	1, 2, 5, 17.
Pringle, Thomas	2, 3, 5, 6.
Squire, Lovell.....	1, 2, 3, 5.
Temple, William	1, 2, 3, 4, 5, 6, 7, 8, 9, 13, 17, 18.
Todd, Thomas	18.
Woolhouse, W. S. B.	19, and prize.
Wright, William	4, 8, 19.

A List of the Proposers and Answerers of such Mathematical Questions as have appeared IN FULL in this Work.

Abbatt, Richard.	Prop. 6, 9, 21; Ans. 5, 9, 12, 14, 25, 33, 34.
Andrew, N. J.	Prop. 41; Ans. 4, 10, 11, 13, 14, 23, 28, 37.
Baines, John	Prop. 22, 23, 42, 43; Ans. 3, 6, 9, 13, 17, 18, 25, 29, 33, 36.
Bates, Edmund	Ans. 27.
Cam, John	Prop. 5, 25, 45.
Carr, W. J.	Ans. 34.
Chivers, J. B.	Prop. 27.
Clay, Henry	Prop. 15, 19, 26, 46; Ans. 4, 7, 14, 19, 26, 30, 32, 35, 37, 40 prize.
Clough, William	Prop. 47; Ans. 3, 5, 35.
Cole, W. J.	Ans. 28, 34, 35.
Collins, John.....	Prop. 10.
Collins, Thomas	Prop. 12.
Collector.....	Prop. 48, 49.

N.B. For a List of the Questions answered by each of the above, see the end of each respective Number.

THE
ENIGMATICAL ENTERTAINER
AND
MATHEMATICAL ASSOCIATE.

NEW ENIGMAS.

*1st Enigma, by J. BATY, Rowelton, near Brampton,
Cumberland.*

THE time when first with high imperial sway,
It was ordain'd I should a man obey,
Can by no records which on earth remain
Be shown to men now living very plain:
Some think that ere the giants (once renown'd)
Were by a mighty flood of waters drown'd,
That I existed not, and that a man
Soon after that to claim me first began;
But now behold how at this present time
I show myself in this delightful clime,
Adorn'd with beauteous works of curious art,
And nature's pleasing scenes in many a part:
For when from orient climes bright sol displays
O'er my delightful parts resplendent rays,
'Tis seen that domes magnificent arise
High in the air "and seem to touch the skies,"
In which the beauteous works are oft display'd
To mortals' view which famous artists made,
And I the pleasant scenes of nature gay
With bright celestial radiance oft display;
For on me verdant plains with beauteous flow'rs
In lustre shine like Eden's blissful bow'rs,
And in rich autumn I with copious store
Of pleasant fruits in parts am cover'd o'er:
But if what now is said will not proclaim
Among the learned bards my famous name,
Then in the sapient king's wise sayings see,
Desire of wisdom bringeth man to me;
For all th' angelic hosts and shining train
In my celestial mansions high remain,

2 *The Enigmatical Entertainer* NO. I.

2d Enigma, by MR. H. CLAY, Moulton; Lincolnshire.

Business and bustle, toil and care,—avaunt!
I cannot brook you now! the Muse demands
An hour, an hour that else were your's:—well pleas'd
I hear her voice, striking melodiously
On my ravish'd ear, soft as the ev'ning breeze,
And not less pleasing than the voice of love,
Than friendship sweet, or music's wildest notes;
Yet humble is the theme that tempts her strain,
And not less humble is the swain who sings.

Beyond where the Atlantic pours his floods,
Where mighty forests rear their lofty heads
Umbrageous, dun; where thund'ring cataracts roar,
And dashing, foaming, headlong roll along;
Where the fell warrior scalps his slaughter'd foe,
And drinks, with savage joy, his gushing blood,
My ancestors resided.—But, at length,
They brav'd the dangers of the stormy main,
And safely landed on fair Albion's Isle,
So fam'd for hospitality, and wealth:
They met there a reception warm and kind,
Congenial to their natures.—But I wave
Further description of my sires, and draw,
With truth unerring, from myself alone.

Beneath the surface of the fruitful earth,
Mole-like I root, and the rais'd hillock shows
My habitation to the prying eye:
Here I might dwell in quiet, but for man,
The proud disturber of all nature's peace.
Who sacrifices all that he may please
His taste and vicious appetite deprav'd.
Well arm'd with weapons keen he sallies forth,
Uproots my humble dwelling, casts me out
On the bare ground, expos'd to ev'ry blast.
I stay not to narrate the minor ills
I'm doom'd to suffer here; how by rude hands
Assail'd, and roughly borne from place to place,
For evils greater far await me now.

Behold the grave prepar'd! the grave!—a sound
That strikes e'en man, undaunted man, with awe,
While trembling seizes upon ev'ry limb:
Yes, see them form the huge terrific vault!
Drear, dank, and deep,—it closes fast upon me!
Here, in the midst of loathsome rottenness,
And foul corruption, I am doom'd to lie—
“For ever?” No. As man, when ev'ry particle

That form'd his frame, strong, beautiful, and robust,
 Has join'd its kindred element and nought
 Indicative of what he was, remains—
 Shall rise again, with life and vigour crown'd;
 So I, when the dread mandate issues forth,
 Shall burst the barriers of my prison-house;
 Convulsion rocks the earth, and, opening wide,
 The yawning sepulchre gives up its charge,
 And th' all-uttering light beams on my eyes once more.

But this affords no room for merriment

Or joyous gratulation; for, lo! now
 The wily net is spread, and I am caught.

With mouth distent, and eye-balls fix'd as fate,
 Behold you Fury heading o'er the pool,
 That, bubbling, throws its noxious vapours round;
 Her left hand holds a shield, proud'rous and huge
 As that Achilles bore, when he drove Hector
 To the shades below; her right uprais'd, grasps
 The dire trident, which she, remorseless, thrusts
 Deep in my vitals; and, as in triumph,
 Holds me fast impal'd. Unfeeling wretch!
 She lacerates my skin, and flays it off!
 Then, as if naught could satisfy her rage,
 She crushes me with Amazonian strength;
 But one bright ray of comfort gilds my end—
 You, gents., acknowledge me possess'd of taste,
 And I'm admitted to your company.

Statesmen, in all the pomp of eloquence,
 Have not disdain'd my merits to discuss;
 Some view me as a blessing sent from Heav'n
 T' alleviate the mis'ries of the land;
 Others consider me the source of woe,
 Of wretchedness, disorder, want, and woe;
 But you, gents., when you rend this thin disguise
 Will find I'm in reality a prize.

3d Enigma, by Mrs. S. CLAY, Moulton.

Ladies! again the winter nights prevail
 And call for anecdote, and curious tale,
 For smart *bon-mot*, and lively *jeu d'esprit*
 To cheer the gloom, and glad the company
 Who, now assembl'd, around the fire sit
 And laugh and titter at their sons of wit.
 The night is cold, the glass is down at zero,
 Your lover enters, and wish him my hero,

Who thus relates his tale :—Fair maids, the swain
 Who tries all arts your tender hearts to gain,
 Who waits upon you all the live-long day,
 Grieves when you frown, and when you smile is gay ;
 Tho' he in these attentions must discover
 More of the tender and impassion'd lover,
 Yet I with him in *politesse* can vie,
 He cannot show you more respect than I.

When fair Amanda trips across the lawn
 T' inhale the balmy breath of early morn,
 Or traverses the flow'r-bespangl'd mead,
 Where lambskins gambol while the heifers feed,
 I her attend :—And when she at the play
 Attracts all eyes, the gayest of the gay,
 I aid her and assist her *comme elle plait*.
 In various color'd dresses I am seen,
 As black and white, as yellow, blue and green.

In ancient times I gain'd a warrior's name,
 And reach'd the highest pinnacle of fame,
 With aim unerring, threw the fatal dart,
 That pierc'd the trembling victim to the heart.

When at the concert lovely Anna sings,
 I call forth music from the trembling strings ;
 And regulate her motion in the dance,
 The German Waltz, or Cotillion of France.

When nature weeps, when darkness veils the sky,
 I may be seen in splendid majesty,
 But, like the meteor hope, should you pursue,
 I fly before and only mock the view.
 Ladies ! pursue not gilded painted toys,
 At best but transient, unsubstantial joys,
 But seek that joy which never can decay,
 Tho' beauty fall, and time shall pass away.

4th Enigma, by MISS CLARA CLAY of Moulton, Lincolnshire.

Ladies ! while raging tempests roar around
 And drifting snows envelope all the ground ;
 While nipping frosts forbid you to retire,
 Far from the precincts of the glowing fire ;
 To cheer the gloom the face of nature wears,
 You to divert and dissipate your cares,
 My hero comes, in flimsy guise array'd,
 And claims th' attention of each lovely maid :—
 Adown the vale, where limpid streamlets flow,
 And kingcups, interspers'd with daisies, grow ;

Where tuneful warblers strain their little throats,
And the wild music on the breezes floats;
Where bounteous Ceres holds her golden reign,
And clothes, with waving corn, the fruitful plain,
I'm always found—I in these scenes reside,
And there my worth will never be denied.

When hostile armies take th' ensanguin'd plain,
Where death, confusion, and fell discord reign,
Where prancing steeds without distinction tread
O'er mangl'd heaps, the dying and the dead,
I urge the work of death—whole ranks recede,
While from each wound they copiously bleed.
They own my pow'r; I rule with potent sway,
And am most valu'd when the most I stay.

To various arts I my assistance lend,
And you, fair maids, esteem me as a friend,
Tho' upon me, 'tis true, you could not live,
Yet when you dine I my assistance give.

But change the scene—at balls and routs I shine,
And feel delighted o'er a glass of wine;
At Epsom and Newmarket I am seen,
Nay, you may find me on the bowling green:
With four-in-hand I dash along the street,
Bespattering ev'ry passenger I meet;
And often as a dandy I appear,
With stays tight lac'd, and fiercely bristled hair,
But hold—enough is told to tell my name,
So now connect it with Associate's fame.

5th Enigma, by MR. PHILIP GOVE, Exeter.

When Strephon gain'd Almanthe's hand,
And she his suit approv'd;
The Swain no longer could withstand,
But knelt to her he lov'd.

Then I was given as a pledge,
By Strephon to the fair;
Her roseate cheeks and lips express'd
Their mutual bliss sincere.

Now change the scene and seek the deep,
Where billows loudly roar;
O'er its rough bosom oft I sweep,
And foreign strands explore.

I oft attend on Men of War,
Oft cater for the fleet;
Both Men and Stores I bring from far
And other things that mete.

Now seek the course and view the race.

See how the horses run,
The sound of me you now will trace,
And name sure as a gun.

Now take a tour to yonder town,
And on a coach pray ride,
You 'll quickly find me by a sound
Near at your front or side.

Ye fair, pray now my name explain,
And bring me forth to light,
The Author gives me for your pains,
With exquisite delight.

6th Enigma, by a HIGHLAND LASSIE.

Should auld acquaintance be forgotten quite?
An' can we ca' it either fair or right,
For fashion's whims, or prejudice, or pride,
The friends o' former, years be turn'd aside?
Let me, ance honor'd by the gude an' wise,
Stand forth, nor you the heaviest claim despise.

A spot there is my ain dear native place;
By nature fraught wi' ilka winning grace,
Gentle an' harmless, there to light I spring,
Soft as the down beneath the turtle's wing.
A ruthless wight, (I scarce can ca' him man)
Proceeds wi' mickle pride, my form to scan,
Then straight, to mischief prone, his skill employs,
An' me, in a' my youthfu' bloom, destroys.
Nature asserts her claim, an' I again
Wi' strength encreasing rise,—but rise in vain,
Remorseless man, my bitter fate, renews
This vengefu' task, an' a' my power subdues.
Where shall I turn?—the gentler sex wad frown
Should I intrude, an' e'en my name disown:
There are wha cherish (tho' the vain deride)
My injured form, wi' "solitary pride."
Ah then disdain them not wha boldly priz'd
Retiring merit by the warl despised,
For to the chiel' forsaken to impart
Protecting kindness, speaks a gen'rous heart.

*7th Enigma, by MR. JOHN HETHERINGTON, Staple-
ton, near Carlisle.*

When raging billows leave Britannia's shore,
And hoary Winter's dreadful storms are o'er,

When groves and meads appear in brightest green,
 And warbling birds in shady bowers are seen ;
 When ardent Sol his radiant light displays,
 And sends forth heat with his celestial rays,
 I, in my turn, my annual visit pay,
 Embrac'd by man at each returning day.
 In this sublunar orb, whilst I remain,
 A verdant hue the fertile meads retain,
 For me man sometimes labour much bestows,
 'Ere from my mouth the healing cordial flows ;
 For those oppress'd where scorching heats prevail,
 I quench their thirst when denser liquids fail.
 Without my use mechanics ne'er had been
 Rais'd to that eminence in which they're seen.
 When daring Cæsar made the Belgæ bleed,
 Of my availing aid, he stood in need ;
 Without my force his arrows might have staid
 Upon the bows on which they then were laid ;
 But now my use to you is fully shown,
 So let my much lov'd name next year be known.

**8th Enigma, by MR. JOHN HOPE, of Hethersgill,
 near Carlisle.**

Ye tuneful Nine, who sweep the warbling strings,
 And bathe your limbs in fam'd Castalian springs,
 Give ENTERTAINER's page with hope to shine
 Round Britain's coasts, and reach the burning line ;
 That future greatness round her head may long
 Add rising impulse to the pride of song ;
 Assist fair science on fresh wings to rise,
 And like ourselves affect the azure skies.

When from the west, Favonian breezes blow,
 And winter hies to hyperborean snow ;
 When spring approaching fairer scenes unfold,
 In yonder smiling mead you us behold ;
 O happy station !—strangers here to care,
 We Nature's sweets in rich profusion share ;
 Around our steps the varied flow'rets rise,
 And kindest parent all our wants supplies ;
 In soft poetic lays our fame is found,
 And charming Maro has our name renown'd ;
 His pleasing muse has not forgot to show
 The rising hopes which from our numbers flow.

Nor yet alone on verdant mead or plain,
 We sip the dew or crop the waving grain,

Perhaps in yonder forest wide we dwell,
 Ascend the oak, or haunt the lonely cell;
 The roaring savage may our presence know,
 And bravely shield us from the ardent foe;
 Nay moss-grown turrets may our form contain,
 "Where mooping owls do to the moon complain."

But oft' in higher sphere you us will find
 With face angelic 'midst the human kind;
 We here assert with consciousness of pride,
 To lovely Helen we were near allied;
 With bright accomplishments alike endued,
 We trod the field and daring foes subdued;
 But fate withstood:—and oh! what sadness stole
 On Sparta's queen and pierc'd her inmost soul,
 When from the massy walls of tow'ring Troy,
 She saw not us, her former pride and joy!

Such is our tale,—but, fam'd ASSOCIATES, know,
 We're not confin'd to fleeting scenes below,
 We dwell above where glowing Phœbus gleams,
 And darts thro' ambient space his piercing beams;
 Alike in feature,—peerless as the rays
 Which sweetly wanton in the diamonds' blaze,
 We hope inspire,—so ancient bards have sung
 With tuneful voice, and harps divinely strung.

9th Enigma, by Mr. JOHN HERDSON, Edinburgh.

To fill a corner of your page
 Permit a rhymers, not a sage,
 But one who hints much plainer;
 And tho' he comes from distant climes,
 He hopes you'll not reject his rhymes,
 In your new ENTERTAINER.

Far distant regions give me birth,
 And there I spring from mother earth;
 A child in Flora's train;
 And when matur'd by Nature's hand,
 I soon become of great demand,
 For speculative gain.

And thence convey'd across the seas,
 By furious gale or gentle breeze,
 To Albion's happy strand;
 Where I, alas! am pris'ner made,
 Until I have a tribute paid
 To him who rules the land.

Free liberty I then assume,
Yet many hardships are my doom,
Which cannot be denied :
In showers of water I am drench'd
Until my ardent thirst is quench'd
By moisture thus applied.

By engines then my frame is shorn,
Until my limbs are cut and torn,
Or, rack'd upon the wheel :
Mechanic power is then applied,
Till blood flows out on every side—
What pressure then I feel!

But change the scene,—I give delight
To thousand thousands day and night,
And banish every care.
Yet in this act of yielding joy,
My vot'ries quickly me destroy :
Now, gents., my name declare.

10th Enigma, by ALPOTHP.

Since ne'er by grave instruction taught
To trace the flow'ry tracks of science;
You must not think my lines are fraught,
With art that bids your skill defiance.

I come in Nature's garb array'd,
Devoid of wit, and wealth, and honour;
Longing in learning's paths to tread,
Fir'd by the fame that waits upon her.

Though little brain's beneath my crest,
And a cranium thick outside it;
I bless my stars that I've a breast,
With a feeling heart near by it.

Once, pierced by beauty's killing glance,
I felt the effects of cupid's quiver,
For through my eye, his subtle lance,
Pass'd onward and transfix'd my liver.

The meagre miser loves the bags
Containing cank'ring heaps of treasure;
Whilst me he wraps in sordid rags,
Forgetting health, and scoffs, and pleasure.

Let now compassion's sons confess,
 If I'm not oft by them forgotten;
 When called by cries of real distress,
 They come—and find her props are rotten.
 Yes—not minding me, they 'll forward rush,
 To save a friend, belov'd, in danger;
 Or from the dread, impending crush,
 Catch back, from death, th' unwary stranger.
 If by your will I lose my head,
 I straight become a thing enchanted,
 Reposing on a fairy bed,
 Unless I am on duty wanted.

11th Enigma, by Mr. PERCI KING.

What moves the innate thinking powers of man,
 The dark and hidden things of earth to scan?
 What moves the hand, obedient to the will,
 And makes it all his offices fulfil?
 Ye sage philosophers, who, skill'd in nature's laws,
 If in your power, shew and explain the cause:
 Be mind the task in various lights to hold,
 My useful self, and clearly to unfold
 The different ways in which I'm what I am,
 And your's to tell the world my hidden name.
 When hope or fear, when joy or misery
 Pervades the soul, your face resembles me;
 I tell the feelings of the lover's heart,
 And shew where cupid lodg'd his rankling dart:
 When men would from the path of duty stray,
 Yea wander, and forsake the good old way,
 I, in the place of danger take my stand,
 And great attention there should still command.
 Time's ever on the wing—how swift his flight!
 To mark his progress is my chief delight,
 Not like my careless sire—each passing hour
 By me's improved, and that with all my power.
 A friend to learning, and to learned men,
 Tho' I ne'er learn'd to hold or use a pen;
 I, in your grammar, long have held a place,
 In logic help, deep reason's chain to trace;
 To keep your books I lend my useful aid,
 And in that sense am sure a friend to trade;
 Numbers by me are raised or brought low,
 Just as I please, or wish for them to go:

Go search great Napier's labours, and you'll see,
A place conspicuous occupied by me :
But I must close, else were I all to shew,
You'd want my aid, my very self to know.

**12th Enigma, by Mr. WILLIAM LESTER, of Wood-
house, near Loughborough, Leicestershire.**

Hail ! happy Britain—thou thy peasant tills,
Thy smiling valleys, and thy wood-crown'd hills
Exempt alike from mighty gifts and woes,
Eternal summers, or ne'er ending snows.
The equal hand of providence assigns,
Where fiery serpents hiss,—the glowing mines ;
Here richest fruits all bounteous nature yields,
There, triple harvests, bless exhaustless fields.
But see terrific—flaming mountains nod,
And nature trembling to the throne of God :
Ah ! here I'm dreadful—ruin spreads around,
And smoking cities strew the riven ground.

Should music's dulcet powers the mind engage,
Sweet soother of our cares—or madd'ning rage ;
Whilst stealing from ourselves at close of day,
We spend the eve at concert, ball or play ;
'Tis there I am, and such my magic skill,
The senses I confound—suspend the will ;
To banish thought, and calm the soul is mine,
Thrill every nerve with ecstasies divine :
The breathless audience, unconscious glow,
With pleasure, music's vot'ries only know.

The child of terror I, or pale affright,
I oft attack the wanderer of the night ;
Or seize the conscious pilferer howe'er strong,
He stops—he starts—as shadows dance along.

I'm friendship's sacred bond when friends are true ;
Or yet attend the careless, how d'ye do.

And you esteem'd ASSOCIATES yet unknown,
Whose pleasing works, I blush not e'er to own ;
O ye, for whom I'd cheerful spread my store,
And warmly greet you at the opening door ;
With ready hand extended quick, invite
Each brother bard to pass the coming night ;
And cordially my subject should be prest,
To welcome in the much respected guest.

13th Enigma, by Miss CHARLOTTE C. RICHARDSON,
of Vauxhall-Street, Vauxhall.

Ye who have learnt to value sterling worth,
And prize true merit tho' of lowly birth,
Will to my simple tale attention lend,
And recognize a warm and constant friend.
The sun had tinged the rose of parting June,
Shed living myriads on the blaze of noon,
On fruit and flower bestow'd the richest bloom,
The luscious flavour, or the sweet perfume;
When, bent on deeds of arms, a desp'rate band,
March'd forth—invaders of a peaceful land.
Superior numbers to their prowess yield;
The victors bear their trophies from the field.
And tedious were the tale, what cruel skill
Was used their dark intentions to fulfil.
Suffice to say, their secret workings past,
A lifeless, shapeless mass appear'd at last,
Useless enough till some designing elf
Put the last finish, and produced myself—
Well known to all, from age's tott'ring frame,
Down to the babe that cannot lisp my name,
By all approv'd, from him who fills the throne,
Down to the meanest wretch beneath the sun.
Then take me, friends, and on your list of fame
With willing gratitude inscribe my name.

14th Enigma, by Miss ELIZ. ANN RICHARDSON, of
Vauxhall-Street, Vauxhall.

Ye rhyming wits, awhile to me attend,
Who truly may be deem'd the scribblers' friend:
Tho' not a sentence did I e'er indite,
For I, alas! can neither read nor write.
And if you search Britannia's history,
You'll find her early Poets knew not me.
But with respect to parentage and birth,
I trace my origin to Mother Earth.
Tho' widely different from my present plan,
As form'd and fashion'd by the hand of man.
A troop of plumed knights around me stand,
In readiness to honour your command;
And when you would dispatch some hasty news,
You frequently their prompt assistance use.
Another hint receive before I go,
I and my knights did this enigma shew.

15th Enigma, by MISS ELEANOR RICHARDSON, of
Vauxhall-Street, Vauxhall.

Think not where beauty reigns, alone to find
An equal share of excellence of mind,
For I, your humble servant, hope to claim
Regard when you have solved my well-known name.
When seeking balmy sleep,—when all is still,
And dreams perchance, forebode approaching ill,
Sudden you wake, and as you trembling lie,
You draw the troubled breath, or fearful sigh:
But recollecting me, your steady friend,
Your fears subside, for on me you depend.
But justice cannot always act her part,
She may be conquered by designing art;
And even I be driven from my stand,
Or torn away by some relentless hand;
But the base wretch who acts so foul a deed,
May if he chooses by this hint take heed;
Perhaps, ere long, tho' in a diff'rent place,
He may receive from me the just disgrace.
Enough of this; I in another light,
Retaining still my name, oft meet your sight;
Where all the sweetest sounds of harmony,
Without my aid would but confusion be;
No more, the veil o'er me so lightly thrown,
When drawn aside, my name and worth you'll own.

16th Enigma, by MR. DAVID ROBERTS, of Torpoint,
near Plymouth.

Dear Gents., and Ladies, join'd in alliance,
To foster genius, and to further science;
Whose piercing wit no artifice can veil,
By your permission, I'll commence a tale:
I'm the loveliest, fairest gift of Nature,
Of form divine, and exquisite in feature;
The joy of man, the soother of his pains,
And he who gains me, a rich prize he gains;
His solace, pleasure, partner in distress,
His greatest blessing, with the pow'r to bless:
Of passions tender, affable and mild,
To sooth his misery, when by cares beguill'd;
A ready helpmate, I return his love,
Constant and virtuous as the turtle-dove.
And yet, I am the very pest of life,
Made up of discord, envy, malice, strife;

Slave to my passions, worthless, paltry, vain,
 Haughty, impetuous, every thing that's mean ;
 Nay vanity itself, a painted tomb,
 Outside all gaiety, inside all gloom ;
 A plague to man, a terror, and a snare,
 Wild as a hind, and timid as a hare ;
 Fierce as a wolf, and wily as a fox,
 And might be liken'd to *Pandora's* box—
 Where every vice was hid ; but hope below,
 Presented their destructive overflow ;
 Not so with me—I'm always growing worse,
 A foe, a fiend, an incendiary, a curse !

Anon you'll find me roving through the wood,
 To man a terror, thirsting for his blood ;
 Or, harmless, saunt'ring thro' the umbrage grove,
 Impell'd by instinct, or subdued by love ;
 Embower'd in the deep sequester'd mazes,
 Or in the meadow spotted o'er with daisies ;
 And if, perchance you there along should pass,
 You'd see me skimming o'er the verdant grass,
 Or, mounting high in air to seize my prey,
 And whirling downward bear the prize away.

Then take a trip to *Greenland*, in a trice,
 You'll see me floating on large fields of ice ;
 Or plunging in the ocean, frisk and play,
 Delighted with its foaming waves and spray ;
 Or on the bottom lie in snug retreat,
 While howling tempests o'er the surface beat ;
 Unmov'd within my house securely lie,
 And the huge billows and their rage defy !
 Withstanding *Neptune's* frowns, and powerful shocks,
 I keep my castle safe, 'mongst living rocks.

On the wide spreading plains of *Mexico*,
 On the *nopal*, I in profusion grow ;
 (That land of riches, eke that land of crimes,)
 From thence I pass, and visit other climes ;
 Yet, not confined to the *nopal* alone,
 'Tis said I once aspired to the throne ;
 And I possess it too —You cry, “ for shame ;”
 I think by this time you'll announce my name.

In pleasure's flow'ry path, and wildering maze,
 Thousands advance, and on perfection gaze ;
 And wonder when they feel their fingers torn,
 That such *sweet* rose, should shelter such *sharp* thorn.

17th Enigma, by Mr. D. T. SHERIDAN, of Colton Hall, Staffordshire.

When wanton stags thro' shady forests rove,
Bound o'er the plains, or frolic in the grove ;
Companion of their steps I may be seen,
And proudly aiding their majestic mien.
But ah ! when I to man my aid impart,
What earthly balm can soothe his tortur'd heart !
Wealth, love, and friendship court his mind in vain,
Death, only death, can mitigate his pain.
In Saturn's reign, when justice dwelt with man,
Ere vile corruption and deceit began,
I bow'd obsequious to her high command,
And often grac'd her fair impartial hand.
E'en now above the cumb'rous fleecy clouds,
I dwell, enroll'd, with heroes and with gods—
When blust'ring prigs, and simp'ring nymphs resort,
To the thronged garret of Thalia's court ;
When their loud bawl all harmony destroys,
'Tis I support them in their gothic noise.
When loud applause with ardent transport fill'd,
The martial champions of th' olympic field ;
When fix'd aloft, the hero guides the rein,
And swiftly glides around the smoking plain ;
'Tis I that ruled the rapid chariot's course,
And kept its union with the foaming horse :
When lovely spring revisits earth again,
And decks with cheerful green, the lonely plain ;
I fondly stray among the fleecy dams,
And aid the gambols of the frisking lambs.
O'er lakes where swans their snow-white plumage lave
I dance supinely on the trembling wave ;
I help to ripen gay Pomona's stores,
And oft repose within her clutt'ring bow'rs,
Or rest on beds of aromatic flow'rs. }
To shun my glance young Stella turns her head,
And hides her blushes in some friendly shade ;
From pregnant dust those buzzing tribes I rear,
" That sport and flutter in the fields of air."
Through crystal Ether's lucid tracts I pierce,
And view the beauties of the universe ;
From Saturn's ring to Mercury's melting sphere,
From Uranus to Terra's bright compeer,
From star to star thro' boundless space I move,
Reviving nature, and improving love.

16 *The Enigmatical Entertainer* NO. I.

When o'er the vast Atlantic Phœbus goes,
And leaves this wearied world to soft repose ;
When Philomel to pensive woods complains,
And mournful Echo joins the plaintive strains ;
I trembling stand on some high western hill,
To bid this fav'rite isle a kind farewell.
But hill, and dale, field, grove and flowery lawn,
Expect my smile, to cheer the breezy dawn.

18th Enigma, by Mr. THOMAS WHICKER, of Exeter.

In Heav'n
I reign'd awhile—the golden harp and lute
Then ceas'd to vibrate, and the song of praise,
Was heard no more : so awful my approach
Th' angelic hosts were all with wonder fill'd.
On earth I've little sway ; for when I'm call'd
To do good actions, tumult drives me hence ;
And miscreants hate the mention of my name.
At midnight hour I visit holy fanes,
And at the altar rest until the cock's
Alarm summons me away—
Then to the cavern of the rock I haste
And, dwell in safety, 'till the raven's croak
Makes me again seek out another spot.
I am so timid, so devoid of power,
A little buzzing fly can drive me hence :
I the gloom of prisons sometimes view,
But there I cannot stay, for clanking chains
Disturb my peace, and I like light'ning fly.
I was with Hamlet when he saw the Ghost
Of him whose breath a brother's hand had stopped,
Until th' impressive words, "Remember me!"
Astonish'd him, and buried me away.
Whisper my name ; for if 'tis said aloud,
It shocks me, and I may no more be found,
Until the gloom of midnight hour, return.
Surely by this, my name you will unfold ;
If not—listen—and you'll find me near.

19th Enigma, by Mr. NOAH WILMOT, of S——s, near
Newcastle-upon-Tyne.

Dear Sir, as you intend, I hear
To publish, the ensuing year,
A work Companion's place to fill,
With science fraught, and riddling skill ;

Accept the offer of our aid
Which here in right good earnest's made,
Provided always you agree
To keep us clean, and neat and free
From aught, that may the eye offend,
When us into the world you send,
And as we've each a social heart,
Let our companions too be smart;
You must besides your word engage,
To furnish us with each a page :
But for above all other treats—
Remember that we sleep in sheets—
That only one lies in a bed—
From which you'll think we never wed—
Yet so strange 's the life we lead,
That two of us but one wife need.
You'll find from these few striking features,
That we're a set of curious creatures :
And have, since first our race began,
Been ev'ry thing to ev'ry man.
Yet howsoever mean our station,
We're always held in reputation—
Have as you'll see,—when found our names—
On learning many weighty claims.
If not yet found, you'll get a clue
In looking Joyce's Dialogues through.

**20th, Or PRIZE ENIGMA by MR. T. R. SMART, of
Loughborough, Leicestershire.**

All hail,—great Master!—shade of Euclid, hail!
(The playful mimic thus begins her tale)—
And Archimedes, thou—a greater still,
When Syracuse proclaim'd thy wond'rous skill;—
Hail, Newton, hail each mathematic ghost,
Which wanders on dread Pluto's gloomy coast!
Hear and rejoice;—to your own maxims true,
And me (as in your days) expose to view :
What tho' the illiterate, rude, ignoble throng
Alike condemn me, and the poet's song!
What tho' the sceptic lets his fancy play,
Sneers while he laughs, and gives his satire way!
Triumphs with scorn, flouts with misjudging skill,
Untaught by vision may be taught to feel :
In days of yore 'twas thus the captious sage,
Motion denied, and dar'd the proof to wage,

His calm opponent rising from his seat,
 Stalk'd o'er the room, and made the fool retreat :
 I own 'tis true when made or fancied right,
 Tho' all material I elude your sight,
 Yet my existence do the wise believe,—
 Those who deny, the proof the muse shall give.

See yon black edifice, in whose dark womb,
 Hid from the eye of day pale spectres roam ;
 Where burns the ceaseless flame with sulph'rous glow,
 And pent up winds with rage tempestuous blow :
 Within this cave, dark emblem of a hell,
 Terrific, black, my grisly makers dwell ;
 There wheels Sisyphean whirl their endless round,
 Creaks the huge stones, with din the caverns sound :
 From this dread spot, matur'd with nicest skill,
 I issue forth, prepar'd to save or kill !—
 Now with the hero, now the leech attend,
 Now the dire foe, and now the wretch's friend ;
 And now the priest ;—oft like that sleek divine,
 Two most adverse indissolubly join.
 To sing my various use the length'ning lay,
 Would fail to end the livelong summer's-day ;
 By female hands on their soft bosoms laid,
 The graver matron, and the youthful maid
 Alike I please, alike partake their care,
 A willing servant to Britannia's fair ;
 Naked, like truth's fair majesty I stand,
 And yield obsequious to each snowy hand,
 Yet, tho' in active business thus employ'd,
 I keep invisible until destroy'd.

Description ends ;—the bard prefers his pray'r,
 O ! let thy vot'ry all thy blessings share ;
 Without thy pow'rful presence, vain he rhymes,
 His works must perish with the present times :
 Then immortality, O ! bounteous give,
 And bid, embued with thee the sonnet live.

NEW CHARADES.

1st Charade, by BETA, of Moulton, Lincolnshire.

My first has, like eternity, no end,
My next to motion is a well-known friend,
Yet, strange to tell, it motion can restrain,
And those it binds, for freedom strive in vain;
My whole's the cause of wrangling and of strife,
Yet from it spring the parent joys of life.

2d Charade, by Mr. H. CLAY.

The morn was fair and all was gay,
A charming time for holiday,
When for my first I started,
My friends to see, the news to hear,
Expecting, too, to meet my dear
As promis'd when we parted.
While stepping on I pass'd my next,
Where stood a lady, much perplex'd,
And frighted at a mastiff:
"Will that dog bite? kind sir," she said,
No ma'am, he's chain'd, be not afraid,
See, he can do no mischief.
I still pass'd on along the way,
Into my whole, where grave and gay
Promiscuously were blended;
Some laugh'd, some talk'd, some heav'd a sigh,
While numbers slept unheeded by,
At their full length extended.

3d Charade, by Mr. H. CLAY.

See from my first the golden harvest rise,
And the proud palace tow'ring to the skies;

In it behold the busy, bustling stage,
On which man acts from youth to tott'ring age :
My next belongs to a superior race,
To it e'en angels yield the upper place ;
God us'd it once, his anger to pourtray,
When guilty man forsook the narrow way :
And holy writ abundantly doth prove
That he is curst who shall my whole remove.

4th Charade, by Mrs. S. CLAY.

My first is of the feather'd kind,
Yet ne'er was known to fly ;
My next, would you improve your mind,
Seize, seize, ere it pass by.
My whole oft grieves the playful boy,
When it approaches near,
He must lay by each pleasing toy,
And for my first prepare.

*5th Charade, by C. N. of W. B., near Creg Barkley
Burrow.*

From foreign climes and distant seas
My first intelligence conveys ;
But hark ! my next did once assist
To entertain a friendly guest :
Look at my whole, it may disclose
And bring to light malicious foes ;
At least the place it oftentimes name,
From whence anonymous letters came.

6th Charade, by Mr. JOHN HOPE.

My first is a cov'ring which art has prepar'd,
To shelter our limbs from the cold,
My next is an incense, and plainly declar'd
A precious jewel of old :
My whole is a tumult, destructive of peace,
Where order is not to be found,
O may such disturbance eternally cease,
And quietness ever abound !

7th Charade, by Mr. Wm. LESTER.

The leader bold in shameless vice,
My first is ever reckon'd ;
A Turkish captain in a trice,
As surely names my second.
When treachery and fraud's combin'd
To blast an honest fame ;
Not e'en my third can safely bind,
The wretch so lost to shame.
But retributive Justice comes,
And oft when least expected :
He sinks into my whole and roams
Unpitied and neglected.

*8th Charade, by Mr. MATTHEW PAXTON, of Etal,
near Berwick, Northumberland.*

A person firm on travel bent,
My first companion with him went,
His errand was a full intent
To give my next away.

But as he trudg'd along the road,
The rain in torrents pour'd abroad,
Each purling rill now roll'd a flood,
O'er cataract and brae.

While every point his eyes explore,
In hopes to meet a friendly door,
My whole, upon a healthy moor,
Appear'd right in his way.

It cross'd his path, his courage fled,
He, daunted, turn'd, and homeward sped,
And thus his message was delay'd
Until another day.

9th Charade, by Mr. DAVID ROBERTS.

My first is flogg'd, to make it move the faster,
No doubt, to the great pleasure of its master ;
My next is found a very wholesome fruit,
To those whose appetite and taste 'twill suit.
My whole, when young, does wear a coat of green,
In England then 'tis very rarely seen :

4th Rebus, by Mr. JOHN HOPE.

What justly ranks the glory of the world,
 And round her coasts victorious sails has furl'd ;
 What's oft expos'd to hunger, cold, and want,
 Bereft of dearest ties which heav'n can grant ;
 What stands the last in Grecia's chosen race,
 With lengthen'd cadence and a flowing grace ;
 What reigns supreme o'er many a spacious land,
 Adorn'd with all the ensigns of command :
 The four initials show a thing whose pow'r,
 Can charm the soul in many a vacant hour,
 Give science fair to each attentive mind,
 O may you this in ENTERTAINER find !

5th Rebus, by PERCI KING.

My whole you will need, when riddles you read
 To bring their hid answers to light ;
 Then if you are clever, my head from me sever,
 I'm made by the Joiner or Wright.
 Cut my head off again, and what does remain
 You'll find if you're looking behind,
 Transpose and then see, who is plumper than me,
 But soon my hid name you'll now find.

6th Rebus, by Mr. WM. LESTER.

Down the sure stream of time have slowly roll'd,
 The valiant deeds of knights and barons bold ;
 How great they liv'd, and fought, and nobly fell,
 Nought but th' historic page, or I can tell ;
 For I contain'd within the cloister'd walls,
 The mighty dead—or, if transpos'd—their halls—
 The hospitable hall—I constant grac'd,
 And added glory to the splendid feast.
 Take off my tail—I'm part of nature's play,
 Which if well form'd, adds beauty to the man :
 But if too long by me, when 'tis transpos'd,
 All grace is vanish'd, and the riddle's clos'd.

7th Rebus, by Mr. MATTHEW PAXTON.

Behead a pickle and you'll find
A river then is left behind;
A new head join, and then though small,
This river is an animal;
Both head and tail decapitate,
And the first head now reinstate,
Then, though 'tis rather strange to say,
A coin is left,—the beast's away.

8th Rebus, by Mr. DAVID ROBERTS.

An insect the Dutch hold in high estimation,
The front of the pride of this Great British nation;
The heart of an ass; an Asiatic plant;
And the head of a magistrate's all that you want.
Now when of these parts you have made due selection,
In London you have it in greatest perfection;
It's held in esteem, by lords and by ladies,
By rich, and by poor, whatever their trade is;
And boxers, and wrestlers, know by experience;
It's said, helpeth greatly their strong perseverance;
And jolly keen sportsmen of every degree;
Without degradation, to it bends the knee.

9th Rebus, by Mr. D. T. SHERIDAN.

The Spouse of fair Helen, whose exquisite charms
And winning address, the world rous'd to arms.
The first of mankind in the annals of fame,
Illustriously noble by nature and name;
The emblem of woe, whose funereal shade
Adds gloom to the night, as it waves o'er the dead.
The initials will name a fair daughter of earth,
The charming Enchantress I lov'd from my birth,
Who visits this globe, breathing fragrance and flowers,
And decks with her smile, the sweet aglantine bowers:
Whose presence enlivens the sorrowing swain
And brings back young joys to his bosom again.

10th Rebus, by Mr. NOAH WILMOT.

Take first of time a certain space,
And two-fifths of a pain severe;
Also one of the insect race,
Held up as an example here:
These give a name if marshall'd right
That ev'ry soft emotion chills;
And proves to many a luckless wight
Pandora's box of countless ills.

NEW ANAGRAMS.

1st Anagram, by Mr. JOHN BATTY.

I'm a part of fair Terra, adorned with flow'rs
In the spring when through ether descend the mild show'rs,
But behead me and then I will quickly appear,
What oft makes this fair orb to be fertile each year;
Now transpose me aright, and I soon will display,
What is often observed in many a way.

2d Anagram, by BETA.

I name you old Dowdy, and part of her dress,
Who travels with matches across the wide moor,
But change me, and then I a something express,
Which, perhaps you may find if you look in the floor.
Transpose, and behold how I gain by the change,
I'm now turn'd immortal—old Time I defy,
And you may believe, tho' the thing may seem strange,
That, nor Homer nor Virgil sung sweeter than I.

3d Anagram, by Mr. JOHN HOPE.

If three in their natural order appear,
Of gents. or of blooming young fair,
Tho' near them you stray, you have nothing to fear,
They'll greet you with kindest air:
But should you adventure their order to change,
Beware, if you value your peace;
For tho' it to some may seem passingly strange,
The horrors of strife will increase.

4th Anagram, by Mr. JOHN HOPE.

All mortals agree I'm to goodness oppos'd,
And to holiness ever a foe ;
But change me, and then I am fully disclos'd,
As forth with the ladies I go ;
Yet change me again, and with truth it is said,
That existence I always proclaim,
For the man who would foolishly say I am dead,
Would certainly lose his good name.

5th Anagram, by N^o 10078, of Moulton, Lincolnshire.

Complete, I'm minute, tho' of wond'rous use,
What confusion without me there'd be ;
By taking my head off you'll quickly produce,
What has oft fill'd the school-boy with glee.
By reversing this last, you will soon bring to light,
What many men too much revere ;
Yet, when friend meets with friend, it increases delight,
And suspends for a-while all their care.

6th Anagram, by Mr. WM. LESTER.

To the coachman, or groom, I'm of infinite use ;
Or check to the villain deserving a noose ;
Transpose me, I'm known to the dairy maid Dolly,
Without me she knows well her labours are folly.
Take away the last letter, with curious art,
In forming nice circles I act well my part:
Another subtract, still in usefulness shine
Instead of these circles I'm now a right line.
Now take off its head, and transpose what remains,
From the storm a good shelter, is left for your pains.

7th Anagram, by Miss ELEANOR RICHARDSON.

Should you wish to cross a field,
Accept of my assistance ;
You'd better take a friend's advice,
Than walk a greater distance.
If you take my head away,
Perhaps I crown you dwelling,
United with a num'rous tribe,
The wind and rain impelling.

8th Anagram, by Miss E. A. RICHARDSON.

To warn you of danger, before you I stand,
Which I'm sanction'd to do by the heads of the Land;
My counsel, unask'd, I most gladly impart
Some virtuous impression to make on the heart;
But if you transpose me you surely will find
A punishment justly for sinners design'd.

9th Anagram, by Miss C. C. RICHARDSON.

The little birds seek me, when ~~the~~ flowers are blowing;
Transpose me, I'm tractable, gentle and kind—
Again, and I'm seen where young Roger is plowing—
Once more, and I'm food, if to taste you're inclin'd.

10th Anagram, by Mr. D. ROBERTS.

In regions of bliss, of transport, and joy,
The righteous possess, without any alloy,
Your servant obsequious.—The fruit of their pain,
While they were ambitious of permanent gain,—
In regions of sorrow, of guilt, and despair,
The wicked experience, what none can declare;
While I, their sad portion, they drink without mixture
Or hope of abatement; a horrible fixture.—
If by transposition you alter my nature,
A being you'll find, an inflexible creature;
True to his trust, (as all servants should be),
He will not surrender his charge, for a fee.—
Once more metamorphos'd, I then am your servant,
Of manners attentive, and humble, and fervent,
Or else I contain, your chattles, and goods,
(Made over on parchment), with meadows, and woods.

PHILOSOPHICAL QUESTIONS.

1st Question, by Mr. JAMES JERWOOD.

Is infinite space really transparent or not?—If it be not, what circumstance proves that the ground of the sky is entirely black?

2d Question, by the same.

Εστὺρ, Ομ, Ιλ, Βηβ, Μ. φησι.

“Εἰτ, ἐκιδέξαι ἡμῖν πρὸς Ἡὸ τ, Ἡελιον τε

“Εἰτ, ἐκιδέξαι ἡμῖν πρὸς Ἡὸ τ, Ἡελιον τε

To what Grecian custom or ceremony, does this passage allude?

3d Question, by Mr. JOHN HOPE.

Where, and at what period was that style of Architecture which is termed the Gothic, first used?

4th Question, by the REV. W. R.

Is there no impropriety in the following sentences, from the Book of Common Prayer? “O Lord deal not with us AFTER our sins, neither reward us AFTER our iniquities:”—and “Prevent us in all our doings, &c.”

5th Question, by Mr. JOHN BATY.

How are the 17th verse of the 3d chap. of Proverbs, and the 18th verse of the 1st chap. of Ecclesiastes, to be reconciled?

30 *The Enigmatical Entertainer, &c.* NO. I

6th Question, by Mr. JAMES HOOD.

Required the most effectual mode for destroying crickets and beetles?

7th Question, by Mr. JOHN HERDSON.

What reason can be assigned for the *Erwie* of animals, vegetables, &c., and particularly sea shells, being found in different strata of sand, gravel and stone, both on the tops of the highest mountains and also at immense depth below the surface of the earth.

8th Question, by M. M.

If the image of a candle be viewed by reflection from a surface that is much scratched, the scratches will appear to lie in circles round the image. Required the reason?

9th Question, by C. N.

At what period, and for what reason, were the FRIENDS first called Quakers?

10th Question, by Mr. H. CLAY.

The acidity of unripe fruit is partly removed by bruising: how is this to be accounted for?

11th Question, by C. C. C. CURIOUS.

Hay when stacked green, will sometimes heat and take fire: explain this upon chemical principles.

12th Question, by Mr. DAVID ROBERTS.

Required the origin of the *botworm* in horses, together with the best method to be adopted as a preventive, and a remedy?

THE

ENIGMATICAL ENTERTAINER.

LAST YEAR'S ENIGMAS.

1. Kingdom	6. Beard	11. Index	16. Female
2. Potatoe	7. Spring	12. Shake	17. Beam
3. Bow	8. Twins	13. Bread	18. Silence
4. Blade	9. Tobacco	14. Inkstand	19. The Vowels
5. Smack	10. Self	15. Bar	20. Point (Prize).

ANSWERS TO THE PRIZE ENIGMA.

1. By Mr. J. ANDREW, *Penzance: to my most esteemed Friend Mr. James Lugg, Ruan Major, near the Lizard.*

Dear Friend at the Lizard,
Now inform me, I pray,
Have you made it a *point*
With Associates to stray?

2. By Mr. HENRY CLAY, *Moulton, Lincolnshire.*

Oh, Mem'ry! I entreat thee, restore the dear scenes
That I lov'd, and are fled—oh, refresh them with dew;
Let the colouring be vivid as when in my teens
I beheld them exulting, and joy'd at the view.

Hail, Childhood! dear season of smiles and of tears,
Of clouds and of sunshine that chequer thy clime,
How fondly I think on thy few transient years
That pass'd without sorrow, unstain'd with a crime.

And Boyhood! the sound fills with rapture my frame,
My heart beats more quickly, my blood brisker flows;
For Mem'ry restores, at the sound of thy name,
The pleasures thou gav'st me, unmix'd with its woes.

What transports I felt when, in life's early morn,
 All objects were glitt'ring, and new to my sight;
 I beheld the fair rose, but perceiv'd not the thorn,
 And snatch'd at each pleasure with eager delight.

Then tops, toys, and taws, were the sources of joy,
 And pure were the pleasures that flow'd on their streams;
 Misfortune but seldom the bliss could annoy,
 And the sorrows of life were regarded as dreams.

And if disappointment o'erclouded the scene,
 The shadow was transient, and soon pass'd away,
 The sunshine return'd, and each little chagrin
 Was remember'd no more, but forgotten in play.

But how can my pen half the rapture display
 I felt when, in youth, o'er the poets' lov'd page
 I ponder'd, and, mov'd by the force of the lay,
 Felt the warmth of the lover, of the hero the rage?

I then beheld Fame, with aspect benign,
 Pointing to Milton, to Shakespeare, and Pope;
 I felt my heart fix'd by the muses divine,
 And to equal those bards felt impell'd on by Hope.

But now the scene's vanish'd, and years gone have prov'd
 'Twas nought but delusion—yet might I once more
 But feel the sensation so ardently lov'd,
 With what rapture I'd seize it, and cry out "encore."

But 'tis past—and this bosom must ne'er again know
 Such transports as these—no! they'll return never;
 Yet some solace 'twill be, in this region of woe,
 To restore but in mem'ry what is now pass'd for ever.

3. *By Mr. T. CROSSLEY, Old Lane, near Halifax.*

Dear Sir, your prize, I must admit,
 Is cover'd with unrivall'd wit;
 But, many a serious musing past,
 I clear'd the hidden point at last.

4. *By C. N. of —, near Creg, Barkley Burrow, Kenwyn, Cornwall.*

O Smart, thou'rt laureate still I find,
 Still Urania's anointed;
 Thy lines display their wonted worth,—
 Besides, they are more pointed.

5. *Epitaph on a Spanish Monkey, buried in a parterre :*
by A. E. Park-Wood, Tavistock.

Beneath this bed of flowers an exile lies,
From Malaga transported o'er the main ; point
Far from the sunshine of his native skies,
Ripe figs and purple grapes, the wealth of Spain.

In buoyant days of youth his rosy hours
Danc'd in delicious scenes of festive mirth ;
'Mid orange groves and lemon, olive bowers,
And vines that crown the region of his birth.

But in our northern climate doom'd to pine,
A victim to the cold of winter's breath,
Though nurs'd with care he felt his life decline,
And to his guardians murmur'd thanks in death.

Thy fate, alas, poor Mono ! leads the heart
To meditate on realms beyond the tomb ;
That heaven of love to which the good depart,
Where fruits of Paradise ambrosial bloom.

6. *By M. A. E. Park-Wood, Tavistock.*

Ut pictura poesis.

Say, what is poesy ? whose breath inspir'd
Enraptur'd bards to celebrate of old
Exploits of brave renown, and heroes fir'd
To emulate the deeds of glory told.

Whence spring the fair illusions that invite
The shepherd to desert his native rock,
And o'er the sea to *point* his daring flight,
Far from the mountain where he tends his flock ?

What prompts the swallow to forsake the nest,
Hoar winter's northern tyranny to shun ;
And with the summer emigrate, in quest
Of warmer climes beneath the southern sun ?

Reply : and then the living fountain know
Whence streams of heav'nly inspiration flow.

7. *By Mr. JOHN HOPE, Hethersgill, near Carlisle.*

Hail, fam'd Associates ! listen to the bard,
He knows your parts, and glories in your fame,
He hopes that still a competent reward
May lustre add to each aspiring name.

He joys that to your powers immense give way
 The subtile force of algebraic lore ;
 That curves to you their varied forms display,
 And geometric proofs unknown before.

He knows that Euclid's—nay, that Newton's parts
 Have pav'd the way for greater efforts still ;
 That you excel in all the curious arts
 Of fluxions, or of differential skill.

But yet, Associates, let this truth be known,—
 A truth as clear as yonder orb of light,—
 Without a *point* you never thus had shone,
 Though oft invisible to human sight.

8. By Mr. J. HUTCHINSON, near Halifax.

A point has oft produc'd a smart
 Applied to nerve or joint ;
 But for your prize, though in disguise,
 A Smart's produc'd a *point*.

9. By Mr. M. PAXTON, *Etal*, near Berwick, Northumberland.

Ingenious Smart, thy *point* is clear,
 Sure nothing can be plainer :
 Long may thy verses grace, each year,
 The page of ENTERTAINER.

10. By Mr. W. RUTHERFORD, *Hawick*, Roxburghshire.

Permit a friend to innocence and mirth
 To join Associate's bards now at its birth :
 Though my pretensions to the muse be slender,
 My humble services I gladly tender ;
 And should my feeble efforts be rejected,
 I will not be dismay'd, nor yet dejected ;
 Well knowing that far abler pens than mine
 Must be employ'd to keep it from decline ;
 Yet I will lend my aid as best I can,—
 What more can be desir'd of any man ?
 And when conjecture may be out of joint
 I will not rigidly maintain my *point*.

11. By Mr. G. STARMER, *Heyford*, Northamptonshire.

O Smart, what wondrous powers are thine,
 How great thy matchless skill ;
 Thy wit like sparkling brilliants shine,
 And keen as pointed steel.

*Answers to the Prize Enigma were also received from Messrs.
 Baines, Baty, Enigmaticus, Hardcastle, jun., P. N., Herdson,
 Waverton, Wilton, and Yewdall.*

GENERAL ANSWERS TO ENIGMAS.

1. *To a Painter: from the Greek of Anacreon.* By Mr. JOHN BAINES, *Parbold Hall, near Wigan.*

Pars humeri tamen tul, pars summa lacerti
Nuda sit, a læva conspicienda manu.

Ovid.

Best of all the limning trade,	4
Noblest of the Rhodian kind,	gdom, 1
With thy colours, light, and shade,	
Draw the <i>mistress</i> to my mind.	16, female
Let the flowing hair be black,	co, 9
Soft and delicately fine,	10
Forming ringlets—and no lack,	
Breathing sweetly myrrh divine.	6
Underneath the shining hair	
Let the forehead, ivory like,	
And the rounded cheeks, appear,	
Ev'ry raptur'd sense to strike.	
Do not let the eyebrows mix,	3
Nor asunder part them wide,	
But as 'twould the best perplex,	15
Where the ends of each reside.	
Let the eyelashes but fringe	
Each persuasive, sparkling eye,	ncc, 18
And in giving them a tinge,	
Imitate the raven's dye.	
Let the nasal prominence,	g, 7
And the cheek on either side,	
With the lily's tint, and thence	
With the rose's blush be dyed.	
Let the rubied lips, within,	
All persuasion's art excel,	pr.
And the finely polished chin,	x, 11
With delicious softness swell.	
Let the blooming sisters three	
Hover round her Parian neck,	wcls, 19
And in perfect symmetry	ack, 5
Every part with beauty deck.	m, 17
Clothe her in a purple vest,—	13
Let its texture be so fine	
Through its folds, when fully drest,	
Some part of the flesh may shine.	toe, 2
Painter, now thy work is done,	s, 8
All thy wond'rous art can do ;	
Take thy wages, and begone :	
Quickly she'll be talking too.	e, 12

(*s. 14, inkstand*).

2. *Autumnus to the Correspondents of the "Enigmatical Entertainer and Mathematical Associate:"* by J. E. B.

Here's a health to ye, bards, whose sweet verse
Appears on ASSOCIATE's pages,
Where my bounties you freely rehearse,
And young nymphs join their praise with the sages.

From all parts of the *kingdom* you came 1
To this *point*, so attractive and fair; pr.
And the subjects thought meet for your fame
Were the fruits that I constantly bear.

With each one's reward I will haste, 2, 13
To all give *potatoes* and *bread*; 5
A soft *smack* to the virgins so chaste, tobacco, 9
And a *pipe* to the silvery head.

Let not *selfishness* mar your delight, 10
And *bar* you from mutual love; 15
But break *silence*, with *vows* to requite 18, 1s 19
The *females* your hearts most approve. 16

I'll crown them with garlands of flowers,
Entwin'd with the ripe *bearded blade*; s 8, 6, 4
Then we'll dance through the cool shady *bowers*, 3
Or merrily trip o'er the glade.

Ev'ry face is an *index* of pleasure, 11
And happiness *beams* from each eye 17
When my presence increases your treasure;
But stay—I must bid you good bye.

Let us part with a hearty good *shake*, 12
With kind wishes oft think of each other;
And pray, when your *inkstands* you take, 14
Speak of me, and of *spring*, my young brother. 7

3. By Mr. T. CROSSLEY.

A *kingdom*—*potato*—*bow*—*blade*, and a *smack*,
Beard—*spring*—*twins*—*tobacco*—*self*—*figure*, and *voice*,
Your first twelve enigmas will solve in a crack:
Bread—*inkstand*, and *bar*, follow up in a trice.
A *female*—*beam*—*silence*, with *vowels* or letters,
Are concluded with *point*, as all riddles should be:
Now all lengthen'd answers I leave to my betters,
And subscribe myself, Gents, your obedient, T. C.

4. By C. N.

In thy island, O Erin, I've oft heard it said
 That *tobacco* and *murphys* are us'd more than *bread* ;
 And with *bow*, *bar*, or *blade* they will push at the man
 Who injures their *females* or tithes high their land :
 What a pity but all like *twins* should agree,
Shake hands with all sects, men of every degree ;
 And with *inkstand* or *index* point full at the time
 When the sons of old Erin will shudder at crime ;
 Will *silence* self-will, in what rank soe'er found,
 Amongst urchins who're *beardless*, or age more profound
 Yes, and *vow* from thenceforth that all discord shall cease,
 And the same ratify with a *smack* of lov'd peace.
 Then the sun-beams in *spring* will give zest to the scene,
 Whilst nature is cloth'd in her liv'ry of green.

5. *Verses suggested by a View of Shank Castle, an ancient Edifice on the River Leven, or Lyne, in the Parish of Stapleton, Cumberland: by Mr. J. HOPE, Hethersgill.*

The western sky with rich *refulgence* glow'd, 16
 The setting sun shot forth a milder *beam*, 17
 When, freed from toil, I took my walk abroad,
 And sought the banks of *Leven's* winding stream.

All nature bloom'd its verdant groves among,
 In rural pride the rose and woodbine smil'd,
 Whilst softly plaintive was the blackbird's song,
 Which charm'd my soul, and all my cares beguil'd.

O pleasing scene ! delighted I survey'd
 The flowing wave, the peaceful cottage near,
 The fields around in richest robes array'd,
 The varied hopes which crown the rising year.

Nor distant far on *Leven's* bank, where grew 15
 The tow'ring oak, the monarch of the wood,
 A moss-grown fabric met my passing view,
 As on a sloping eminence it stood.

With hasty steps I to the pile drew nigh,
 Trac'd ev'ry feature, walk'd its form around ;
 The wild grass wav'd upon its turrets high,
 And rude projections mark'd its ample bound. 2

Whilst thus engag'd, the sweeping flight of time,
Which levels empires with resistless sway,
Rais'd in my breast the solemn thought sublime,
And thus in pensive mood I seem'd to say:—

Stupendous structure! where is now the pow'r,
The arbitrary laws, which once were thine?
Where now the banners waving on each tow'r,
The round of music, or the joys of wine?

Where now the armour round thy casements shown,
The *bow*, the *pointed* lance, and warlike shield?
Where now the valour, when the trump was blown,
The foes to meet, or dare them to the field?

3, *pr.*
s, 19

Where now the heroes that adorn'd thy halls,
Talk'd o'er their battles, once accounted brave,
Repair'd thy ramparts, fortified thy walls,
And gave their lives thy boasted rights to save?

9

Alas, no more! for ever past are these:
Thy state is ruin'd—all thy pride is gone;
Unroofed, thy chambers court the heav'nly breeze,
And harbour inmates formerly unknown!

16

And shall I say that breach on *breach* deforms
Thy threat'ning walls, which once defied the foe;
That now each turret *shakes* when Boreas storms,
Blows o'er the height, and sweeps the vale below?

13

12

4

Ah, fallen fabric! who now fears thy name?
Who at thy lordly gate submissive *stands*?
Who joins with heart and hand thy loud acclaim?
Or hears thy *master's* absolute commands?

ink, 14

t, 5

There was a time, when, gath'ring from afar,
Thy vassals heard the dreadful martial sound,
To join in cruel feats of ruthless war,
Or dye with crimson stains the verdant ground!

Then sad dissension rag'd the *kingdom* through,
From sea to sea Bellona pois'd her shield,
Destroy'd the labors of the peaceful plough,
And sought for honours in the tented field.

1

10

But, as before majestic Homer's days
Oblivion cancell'd many a hero's name,
So thine have perish'd, void of tuneful lays,
To paint their glories and record their fame.

Yet, why complain? the Christian Muse repels
 All deep'ning sorrow, whilst on halcyon wings 8
 O'er scenes like these she now a moment dwells,
 And of thy past and present fortune sings. 7

The times are changed! O rather then rejoice:
 Sweet smiling peace her olive bough expands; 11
 Let deadly war, no more thy owner's choice,
 Its banners spread in far, far distant lands. 6

6. *The Dream: by P. N. London.*

[The following monitory address was written for the "Mathematical Companion," as a general answer to the enigmas, &c. contained in that work for the year 1826; but as it was not used as originally intended, it is now offered for insertion in the "*Enigmatical Entertainer*."]]

To the Editor of the "*Mathematical Companion*."

"Dreams are but Fables," it oft has been said,—
 Thoughts in sleep, which assail us when slumb'ring in bed:
 That they always are false, is to me not so plain,—
 I have found many true, and expect to again.
 Not that I've faith in a *je ne sais quoi*,
 Yet Effect follows Cause, Sir, you very well know:
 If the Cause, Mr. Ed. be, no bards will contribute, 15
 What will the Effect be? You'll have nought to exhibit.
 In what? you are thinking—why talk thus to me?
 Of *Companion* I speak, as you'll presently see;
 But as I'm aware you conciseness esteem,
 Without further digression, I'll tell you my dream.
 As to time ('twas full moon) I'm exact to a T;
 Year, eighteen twenty-six, night of March twenty-three;
 Whilst reflecting, I gazed on the fair *queen* of night, 16, *female*
 Till a cloud interven'd she was hid from my sight;
 Then, whilst thinking of *Robarts*, sleep my eyelids did close, *co*, 9
 Which led to the vision I've now to disclose:—
 I was seated, with others, in a splendid saloon,
 'Twas in *Robarts's* mansion, and I think, in the moon;
 'Twas so grand that its beauty defied all description—
 One would fancy 'twas built by a joint-stock subscription:
 The pillars were marble, of Parian whiteness;
 The beams were so gilded they wearied with brightness; 17
 The curtains and sofas were crimson and gold;
 The lustres and goblets were rich to behold:
 To conceive but its splendour you should surely look on it;
 Then 'tis futile in lines few as those of a sonnet
 For me to pretend to describe all I saw:
 But who present—and why—you will find just below.

Friend Roberts, the host, by right fill'd the chair :
His guests were Companions,—no other were there ;
The bards of all years (who had written) did mix,
From seventeen ninety-eight to eighteen twenty-six.

On the right of the host I saw Wilmot was seated ;
Lester on his left, and both kindly he treated ;
There were Martin and Baines, Hope, Clay, and Burrington, 19
Sheridan, Savage, Bosworth, Nield and Woolston,
And a great many more, friends and brothers in rhyme,
But those I have nam'd will suffice for the time.
After quaffing awhile the good wine and strong spirits,
The talk turn'd on *Companion*, its worth and its merits :
'Twas just at this moment that Roberts arose 8
And call'd "All fill a bumper, I've a toast to propose."
The glasses were fill'd, in suspense all were hush'd,
Then the chairman so mildly his guests thus address'd :
"Gents. you're aware, in all things, save sinning,
How hard 'tis for man to make a beginning ;
So hard that 'tis said, well begun is half done,
And when the race is well started the prize is half won ;
Then drink to friends Hindson, Nield, Bosworth, and Savage,
These bards did *Companion* in its outset encourage."
This was warmly received, drank with thund'ring applause,
Which no sooner had ceas'd than friend Savage arose.
"Mr. Chairman," he said, "as you've nought to say more,
I return sincere thanks on behalf of the four ;
And I'll briefly relate what *Companion* had been
'Till the year you were laureate, eighteen hundred fourteen :—
It was then, in the year seventeen ninety-eight,
By Davis protected, it first saw the light,
With a preface well written, a sort of defence,
And in garb unassuming,—price only ninepence :
Friend Hindson's enig. was the first met our eyes,
And Bosworth's the first singled out for the prize.
With No. 3 'twas proclaim'd, 'All those who are willing 7
To take the *Companion* must now pay a shilling.'
Yet it still was supported by wit and by talent—
Bards wrote of *ink-dish*, legend, archive, and warrant. 14
Keeping pace with its worth, Davis raised it in price,
Disregarding its fate, and his best friends' advice.
He said "'Tis expensive, and there's my assistance,"
So eighteen hundred fourteen saw its price two-and-sixpence. 11
From that time to the present its progress you know,
But its fate for the future there's no man can show."
Savage then took his seat 'midst astounding applause,
Which did but redouble when Wilmot arose :—
He bow'd to the chairman, whose return was a smile, 3
Then for *silence* he waited with patience awhile : 18

He then mildly began—there was silence profound— 13
 His action was graceful, his voice full and sound—
 “ You, Gentlemen all, are aware that our host
 For years has been here at his fam’d lunar post;
 And we must not suppose he’s mark’d ev’ry gradation
 That we have experienc’d in our English nation; 1
 And with us would he go, how he’d stare when he’d seen
 How we all things now do either by gas or steam:
 To see our *vessels* defy wind and tide, 5, *smack*
 By steam hurried onward, their powers deride; 6
 And could we from our graves in a century peep,
 We should then see by steam, people eat, drink, and sleep:
 As to gas—the balloon which convey’d us to him
 Will show that its pow’r is surpass’d but by steam.
 But now to the subject for which I arose:—
 To speak of *Companion* it is I propose;
 In which last year you find Baty wrote on water,
 Lester on finger-post, E. A. on hammer:
 Its progress I’ve witness’d for at least twenty years, o, 2
 What it has been, and is—and what it will be, appears:
 Its end fast approaches (I speak under the rose) 12
 Its race nearly is run, its life draws to a close;
 These are my opinions, and I’ll now tell you why—
 Few will contribute, and fewer will buy.
 To pay four shillings for what was ninepence whilom;
 And but thirty lines now, where ’twas *ad libitum*.
 Ha! ’twas Dickson did this, in eighteen twenty-four:
 This encroachment was worse than all those made before;
 And the treadmill he merits from morning to night,
 Thus to add to the price and infringe on our right:
 And as to his work, ’twill survive not much longer,
 Unless his contributors muster much stronger;
 And I think I may venture to say, that, at most,
 ’Twill but see No. 30, then give up the ghost.”
 It was thus Wilmot ended. Then Lester arose,
 Whom I much wish’d to hear, as you no doubt suppose;
 But just at the moment that peace was restor’d,
 And he’d bow’d to the chairman, my sleep was disturbed 4
 By a knock at my door, and “ ’tis past six o’clock, Sir,”
 So my dream ended here, Mr. Ed.—but pray stop, Sir;
 Just a word or two more, then I’ll surely take leave,
 And you on your own cogitations may grieve:
 ’Tis your own fault, I tell you—and that, too, at parting,
 You despis’d the advice of both Lester and Martin;
 And *Companion* upbraids you with bitter reproaches;
 But the die is now cast, and its end fast approaches.

Thus it happens to despots who'd govern the state,
 Despising sage counsels, repent when too late ;
 Exercising their veto while mis'ries are brewing,
 Till all are o'erwhelmed in one common ruin."

And now, ENTERTAINER, before I conclude,
 To health and long life I would *point* you the road : pr.
 When your best friends advise you, turn not a deaf ear ; 10
 Nor be *selfish* and haughty till dangers are near ;
 But regard how the days of *Companion* have ended,
 Who was by wit and talent so highly befriended ;
 And let his sad fate be a warning to thee,
 So shall thy career be resplendent and free.

7. By Mr. W. RUTHERFORD.

A *kingdom* will the first enigma name,
Petaloe, *bow*, and *blade* will do the same
 With the succeeding three ; then comes a *smack*,
 And *beard* and *spring* appear just in a crack ;
Twins and *tobacco* will throw off the veil
 That shrouds two more—the next I must conceal
 And keep it to myself—but all the rest
 In course must be explicitly express'd,
 Because an *index* now stands forth to view,
 Which will make known the yet remaining few.
 The next appears to be a *sound* or *shake*,
 Then follows *bread*, if I make no mistake ;
 An *inkstand*, *bar*, and *female* now explain
 Four in succession*, and three now remain :
Silence and *vowels* plainly answer two,
 And *point*, I trust, will bring the prize to view.

**Beam* is in *bar* and *female*.

8. *Elegy written in Bosworth Field, on the Anniversary of the
 Battle, August 22d: by Mr. T. R. SMART, Market
 Bosworth, Leicestershire.*

The sun declining o'er proud Gopsal's tow'rs 18, *silence*
 Sheds round the *beauteous* scene a milder ray ; 10
 And Zephyr, from the meadows deck'd with flow'rs,
 Cools with rich odours Autumn's closing day. 8, *twins*
 Here, by the well where Richard sipp'd, I stand, 13
 And ponder days of yore in thought profound ;
 In fairy vision see each hostile band
 In tented pride on Britain's classic ground. 9

Yes—on this spot Plantagenet repos'd ;
 On this small mound the royal standard stood ;
 Adown this slope his trusty veterans clos'd—
 The rear secur'd by Ambion's waving wood.

Wide o'er the plain, far as the eye can view,
 Where Bosworth's hill has giv'n the field to fame, 17
 There heartless Richmond spread his motley crew, k, 5
 And trembled at the Lion Richard's name.

Cold blooded dastard ! lost to honor's ties, 4
 Who, *trembling*, shrinking at the coming strife, 12, *shake*
 Bade his best friends assume a like disguise, 16
 And seal'd their death to save a worthless life ! 10

On to the left, where leafy Ambion stands, ink, 14
 Where to the vale the hill slopes gently down,
 There trait'rous Stanley kept his murd'rous bands,
 And sold at once his sovereign's life and crown !

Near yon old dodder'd tree which marks the right,
 Where flows the brook meand'ring through the dell,
 Ill-fated valor bow'd to Richard's might— 3
 'Twas there the brave the gallant Cheney fell.

Too faithful servant to so base a lord ;
 Yet shall thy mem'ry claim the meed of fame :
 Hist'ry thy virtues and thy fate record,—
 And humble Sutton bears thy honor'd name. 6

There, at the flow'r-crown'd hill's extremest base,
 Where hidden *springs* exhale th' unwholesome fog, 7
 The treach'rous surface check'd York's desperate race
 And plung'd White Surry in the dang'rous bog.

And on that spot, by foes, by toil uncrush'd,
 The palsied Henry in the hero's sight,
 The younger Stanley with his bloodhounds rush'd,
 And numbers slew, whom, singly, none dare fight !

Hapless not full the measure of thy woes,— 2
 Thy life, thy *kingdom* sacrific'd in vain ; 1
 Th' insatiate malice of the blood-red rose
 With crimes unfounded dar'd thy mem'ry stain !

The venal Trussel led the lying race—
 False all he wrote, to flatter early won ;
 With vip'rous venom heap'd the foul disgrace,
 To please the wretch who murder'd Edward's son !

The tuneful tribe in Lancaster's vile sway
 Disgrac'd the muse the story to rehearse :
 The matchless bard of Aven pour'd the lay, 15
 And damn'd thy mem'ry in immortal verse.

Yet, though that verse to latest times shall live,
 While meaner bards shall die and be forgot,
 The meed of truth shall future hist'ry give,
 And clear thee from so false and foul a blot.

Eternal truth shall guide th' unbiass'd pen
 T'inscribe her dictates on the sober page ; 11, *index*
 And, stripp'd of lies and flatt'ry, show the men,
 Richard and Henry, to the latest age.

9. *Address to Mr. F. BURRINGTON : by Miss*
 WINIFRED WAVERTON.

For a husband I thought I would once advertise,
 And prais'd my accomplishments up to the skies ;
 Yet, though I presum'd this expedient to try,
 The gentlemen all were confoundedly shy :
 I suppose they consider'd me rather too bold,
 Or, what is still worse, growing ugly and old.
 I'm no beauty I own, but we frequently find
 The visage an *index* to judge of the mind.
 Now all the old *blades* in the *British dominion*
 Are welcome to see me, and pass their opinion :
 What, though my long nose may peep into my mouth,
 And these charming black eyes roll East, West, North and South ;
 My boasting is vain while deficient in self,
 And enough I've asserted in praise of myself ;
 So in *silence* I'll rest, and no longer repine,
 But on *bread* or *potatoes* contentedly dine :
 My pipe of *tobacco* at ev'ning shall soothe
 Each fond sigh of my heart, each regret of my youth.
 But to come to the *point* : since such freedom I use—
 And a *female's* petition no *bard* should refuse—
 What you hinted before in a dream I'll forgive,
 If the new Entertainer your favors receive :
 You can write on the *spring*, or the sun's cheering *beam*,
 And not make our sweet pretty chatter your theme :
 When young beaux or old greybeards together assemble
 They make such a noise till we're all on a *tremble*.
 But no more on this subject,—you wonder no doubt,
 What all this preamble and fuss is about ;
 Why, to tell you the truth, there's no reason I see
 That you should not hold *correspondence* with me.

To love's idle ~~sows~~ we'll make no pretence,
For in friendship, believe me, there's more solid sense;
And now, ere my *inkstand* shall fail, let me say,
Your answer I hope for on some future day.

10. *To Enigmatists: by Mr. T. WHICKER, Esq.*

Dear Gents. I hope you will not bicker,
Since there's no merit in T. Whicker,
Yet he'd among you shew his nose:
None in the *kingdom* duller made,
Potatoes or *tobacco's blade*
Serves him for *bread* and sleeping dose.

'Twould be a charity divine
If Editor would let him dine
With him only on sabbath days;
But stop—mayhap 'twould blunt what wit
Does in his pericranium sit,
And surely that's not worthy praise.

No *spring* is in his *bow*, it seems,
Yet he, poor elf, of prizes dreams—
The sound thereof gives him eclat;
The case is, this gives him a *smack*
Of *beaming* honors on his back,
Or wreaths of laurel round his brow.

There's sure a something urges on,
Nor can I yet pronounce it fun,
To get my mystic sirs among;
So, if this answer's not in print
I sure shall say the devil's in't,
As fools sometimes with wise men throng.

So a bad *bargain* may go off,
Though *owels* and *inkstand* keep aloft,
And tongues break *silence* at the deed;
Though thistles, with their steel-like *points*,
Flock around when genius mounts,
The heav'nly spark will onward speed.

So I remain, as heretofore,
Your humble servant, yea, and more;
And if this answer muster pass
I'll give you all a bumper glass;
By such encouragement, again
Serve ENTERTAINER with a strain.

11 *On the Death of the Mathematical Companion: by
Mr. J. YEW DALL, Hunslet, near Leeds.*

Ah! fatal year of twenty-five,
Remember'd with regret; ad, 13
The generation now alive
Thy name will ne'er forget.

Thy morning sun how bright it shone, am, 17
To dazzle mental sight;
Commercial men thou scorch'd at noon,
And nipp'd with frost at night.

'Tis true, thou didst wheel out much trash,
And kill'd a deal of filth;
The branches lopp'd which were but flash
Ingrafted there by stealth.

But oh! what plants along with these
Were rooted up and torn,
Which *springs* hereafter had made trees 7
Our *kingdom* to adorn. 1

What numbers in the prime of life
Receiv'd a deadly wound,
Who linger'd till diseases rise
Remov'd them from the ground. rels, 19

Some, such as these, in twenty-six
Have yielded up the ghost;
And oh! it grieves me much to mix
Companion 'mongst the lost. pr.

He'd scarce attain'd to thirty years,
Though grown so fond of pelf;
Five several times, as it appears, le, 16
He'd rais'd the price of *self*. 10

I own he had improv'd his type, x, 11
And shown us, when grown bigger,
Enigmas on *tobacco-pipe*, 9
Potatoes, twins, and figure; 2, 8

On *beard and blade, bow, smack, and shake*, 6, 4, 3, 5, 12
And though not prov'd as yet,
'Tis thought, if e'er his ghost should speak,
'Twould say "I died in debt."

This *silence* men may misconstrue, 18
Yet one thing must be plain,—
The prizes that were justly due
His trustees sold for gain.

NO. 11.] *The Enigmatical Entertainer.* 47

May ENTERTAINER then beware,
Lest av'rice ruin him ;
With justice strict his prizes share
Where genius marks the theme.

* * 14, *Inkstund.*

*Answers were also received from Messrs. Baty, Enigmaticus,
Hetherington, Herdson, Paxton, W. P. and J. Richardson.*

ANSWERS TO THE CHARADES.

- | | | |
|----------------|--------------|-----------------|
| 1. Opinion | 5. Post-mark | 9. Top-mast |
| 2. Church-yard | 6. Garboil | 10. Necklace |
| 3. Landmark | 7. Vagabond | 11. Bank-note |
| 4. Bed-time | 8. Current | 12. Title-page. |

Ode to Disappointment: by Mr. JOHN BAINES.

Istuc est sapere, non illa,
Quæ futura sunt, prospicere. Ter.

And what's th' anthropoan span? mast, 9
A changeful April day,
Deluding wretched man,
Bound to its fickle sway, page, 12
Who feels the gleam, a moment's power,
But quick descends the pelting shower,
And chills his frame for many an hour, churchyard, 2
'Till gloom around the prospect bound, mark, 5
And all his cherish'd hopes lie reckless on the ground. lace, 10

This world, and all its toys,
Its gewgaws glitt'ring neat,
Yield no substantial joys,
Where lurks the fiend, deceit;
Then why should man, worn down with toils,
Be gull'd by future's fairy smiles,
Or why confide in fortune's wiles? rrent, 8
When soon from ill, devoid of skill,
His quiv'ring hand will freeze, his throbbing heart be still.
[ak-note, 11

Oh, disappointment stern !
 Thy gall-drench'd locks, and frown, mark, 3
 Are not to me to learn—
 Thy visage long I've known : abound, 7
 And when thy haggard form appears,
 Familiar grown through length of years,
 I heave no sighs, I shed no tears;
 But humbly trust, as fragile dust, time, 4
 In God's mysterious ways, unfathomably just.

Answers to the Charades were also received from Messrs. Baty, C. N., Enigmaticus, Hetherington, Kniveton and Oakes, Paxton, W. P., J. Richardson, and Rutherford.

ANSWERS TO THE REBUSES.

- | | |
|-------------------------------|-----------------------------|
| 1. Flow, wolf, fowl, owl, low | 6. Niche, chine, chin, inch |
| 2. Star, tar, rat | 7. Souse |
| 3. Gretna Green | 8. Beef-steak |
| 4. Book | 9. May |
| 5. Craft, raft, aft, fat | 10. Termagant. |

The Death of Phaeton ; translated from the Latin, Ovid's Met. ii, 304: by Mr. JOHN BAINES.

Then thus th' omniscient and almighty sire 6
 Address'd the gods, the universe on fire :—
 " Be witness, Phœbus, all ye powers attest
 " What mighty flames your palaces invest ; w, 1
 " And that, unless I prompt assistance lend,
 " Earth, seas, and skies will soon in chaos end."
 The lofty domes of highest heav'n he gains,
 From whence the clouds pour down impetuous rains ;
 From whence the forked thunderbolts are hurl'd,
 And scatter terror o'er a guilty world.
 But then nor clouds nor drenching showers were found k, 4
 To stop the conflagration, raging round ;
 So that with lifted arm through æther clear gant, 10
 He hurl'd his lightnings at the charioteer,
 And drove him headlong both from car and life,
 And quench'd with fiercer fires the elemental strife.
 In restless rage, the horses of the sun
 Far from the beaten track disorder'd run, f-steak, 8

And, bounding furious in a different course, 7
 Rend the strong harness with resistless force.
 Here lie the bits, the shatter'd axle there,
 The silvery spokes in fragments strew the air, 9
 And Phaeton, his golden locks on fire,
 Falls, like a shooting star, by Jove's imperial ire; 2
 Whom the great Po, far from his native land, green, 3
 Receives : descended near its winding strand,
 His blacken'd corse, lavated by the wave, ft, 5
 Finds on its borders, finally, a grave.

The Rebuses were also answered by Messrs. Baty, C. N., Enigmaticus, Kniveton and Oakes, Paxton, W. P., J. Richardson, and Rutherford.

ANSWERS TO THE ANAGRAMS.

- | | |
|----------------------|-------------------------------|
| 1. Clime, lime, mile | 6. Halter, lather, lathe, hat |
| 2. Drab, brad, bard | 7. Stile, tile |
| 3. Trio, riot | 8. Priest, stripe |
| 4. Evil, veil, live | 9. Mate, tame, meat |
| 5. Stop, top, pot | 10. Reward, warder, drawer. |

1. *To a Rose ; from the Greek of Anacreon : by Mr. J. BAINES.*

Accipiant sertas nardo florente coronas,
 Et nunquam fugiente rosa. *Lucan.*

Let us mingle, jovial boys, c 4
 Roses with the sparkling wine ; ter, 6
 Let's enhance our mortal joys
 At the bacchanalian shrine.

While the crimson-tinted rose 3
 Gracefully is wreath'd around m, 1
 Joy-exhilarated brows,
 Let the jest and wine abound. le, 7

Lovely fav'rite of the spring,
 Rose, thy lustre charms our eyes;
 Men, below, thy praises sing,
 Gods, above, thy beauties prize.

Cupid, o'er th' enamell'd mead,
 Blooming nymphs, and Graces fair,
 Gaily dress'd, the dances lead,
 With their rosy-braided hair.

Crown me ('tis my heart's desire), 9
 Bacchus, with a rosy crown ;
 Then I'll strike the sounding lyre, p. 5
 And my cares with drinking drown.

Then, while rosy wreaths entwine, ard, 10
 Glitt'ring in the locks of hair,
 And while roseate beauties shine,
 Let me not of life despair.

* * 2, drab ; 8, priest.

2. *Lines written on visiting a deserted Bucking and Cobbing-house* : by C. N.*

No more we hear the hammers clash, 4
 Nor evil see indignant flash
 In captious maidens' faces ;
 If through the house perchance you walk, 5
 No more that gay incessant talk,—
 Now empty are their places.

Some maids there were amongst the crew,
 Who did pure virtue's paths pursue,
 And priestly learning sought ; 8
 Like mile-stone stood, unshaken, firm ; 1, p 5
 Nor did they seem to suffer harm
 While by religion taught.

Oft have I seen the girls in line, 7
 Perhaps from nine to twenty-nine, 3
 Abreast the bucking mills,
 With massy irons repeat the blow,
 No halter tougher than I know, 6
 Or mate who bumper fills. 9

How chang'd the scene from times gone by ! drab 2
 Now all in mournful silence lie, 1

Now none the place regard :
 Once all was bustle, work, and noise
 'Mongst laughing girls and jocund boys, e 7
 Who met a due reward. 10

Answers to the Anagrams were also sent by Messrs. Baty, Enigmaticus, Kniveton and Oukes, Paxton, W. P., J. Richardson, and Rutherford.

* Bucking and Cobbing are different processes used in reducing ore to a size to make it merchantable. Bucking-mills are flat masses of iron, used for pulverizing the ore on by means of hammers with a wide surface, termed bucking irons.

ANSWERS TO THE CHARADES, REBUSES,
AND ANAGRAMS.1. *By Mr. T. CROSSLEY.*

Ye riddlers, to solve all your puzzles so clever,
In the order they're printed, I humbly endeavour.
My *opinion* is this—that the second's *church-yard*,
Then *landmark* (both writ by the Lincolnshire bard),
While *bed-time* and *post-mark* unfold the two next,
Then *garboil*, with which I was rather perplexed.
A *vagabond*, *current*, and *topmast* appear,
Then a *necklace* of jewels, for ladies to wear;
Then Starmer's *bank-note*, which to all proves a friend—
The *title-page* (bless us!) is plac'd at the end.

The Rebuses next in true order shall *flow*;
For *star*, *Gretna Green*, and a *book*, you must know,
Are conceal'd with much *craft* in the *niches* of fame;
But, after some trouble, I hit on each name.
Souse, *custom*, and *May*, in due order appear;
And a *tyrant*, I find, follows up in the rear.

The Anagrams, now, I must try to unravel,
For *clime*, *drab*, and *trio*, are follow'd by *evil*;
And evil deserves to be *stopp'd* with a *halter*,
If no other means her sad progress will alter.
A *stile*, *priest*, and *mate*, are replete with good matter—
I hope the fair writers will soon find the latter.
But as I have done, and my task has been hard,
Pray, good Mr. Editor, where's the *reward*?

2. *Lines written at the close of the Year: by Mr. J. HOPE.*

"Cinis, et manes, et fabula fies,
"Vive memor lethi: fugit hora." *Per. Sat. 5.*

Another year is o'er! Associates, *stop*;
Ask the momentous question—Is it gone?
'Tis gone, indeed! its hours, and days, and months
Have join'd that flood whose *currents* silent *flow*
Through *climes* where darkness and oblivion dwell.
Go to the *niche* within "the cloister'd walls,"
Peruse the *books* whose *title-pages* glow
With names deep read in antiquated lore.
The *church-yard* lightly tread, where heaves the grave
Of many a *mate*, gone to his last *reward*.
Believe the *hard's opinion*, these will show,
Like fixed *land-marks*, all that now remains
Of the events or persons whom they call
To our remembrance. All the rest, my friends,
Has sunk to dust, save man's immortal part,
Which claims eternal ages yet to come.

From scenes like these how much is to be gain'd,
 If serious, calm reflection lead the soul
 To heav'nly wisdom: but, oh! now inquire
 What lasting benefits the years now closed
 To us have left behind. As moments fled,
 Mark'd by the *stile* on yonder dial plane,
 Did we endeavour studiously to shun
 Each *evil riot*? Did the accents grave,
 Pathetic, or awak'ning, of the *priest*
 Beneath the sacred roof, our hearts attune
 To harmonize with heav'n's all perfect will?
 Did we, at *bed-time*, duly weigh the scenes
 Of days departed? Say it in a word—
 As last year *posted* on with *marked* speed,
 Did we bend ev'ry nerve those joys to gain
 Which dwell in heav'n, and bloom for evermore?

And were these things neglected? Ah, reflect!
 The year now present bears a grievous load,
 But not it's own: look to it and improve.
 Whilst *vagabonds* each *garboil* wild attend,
Bank-notes and *necklaces* with *craft* to steal;
 Whilst even *steaks of beef*, or trifling *souse*,
 Cause *termagants* to scold, or pilfering thieves
 To dread a *halter*; whilst the amorous swain
 Hies off to *Gretna-green*, O moments seize!
 Seize and apply them! Who can tell how soon
 The thread of life, spun by the Destinies, may snap,
 Whilst, like the *tar* upon the *topmast* high,
 We hang suspended, and the storms of fate
 Rage wild around us?

Answers were also received from Messrs. Hutchinson, Herdson, Whicker, and Yendall.

ANSWERS TO THE REBUSES AND ANAGRAMS.

By Mr. J. HETHERINGTON.

Sweet *May's* approaching. See the solar orb,
 Bright *star* of day, enliv'ning beams extends
 To northern *climes*; and nature, long o'erspread
 With russet hue, puts on a robe of green.
 O charming season! Now the warbling train
 Select their *mates*, and, *veil'd* from public view
 Amidst the grove, pour out the notes of love.
 Here springs the primrose, there the lily fair
 Expands its lovely petal in the vale.
 But, fam'd Associates, 'midst these pleasing scenes

The *bard* recalls to mind your *flowing* lines.
 The day is near, and, like a love-sick swain
 Who speeds to *Gretna-green*, he musing strains
 His every nerve; yet, fear'd, he sometimes *stops*,
 Lest want of talent or the mystic *craft*,
 Or elegance of *style*, may him exclude
 From that fair *book*, where, high enroll'd in fame,
 As in a *niche*, each Entertainer stands.

O kindly, Editor, my fears assuage:
 Like nature now put on your fav'ring smiles,
 And bid me welcome. I will you *reward*,
 Whilst *termagants* in *trios* roundly scold,
 And *stripes* inflict for *souse*, or *steaks of beef*;
 Whilst thieves are pilfering, and a *halter* dread.
 With each returning May you me will find
 To you engag'd, a firm and constant friend.

GENERAL ANSWER TO THE ENIGMAS, CHA- RADES, REBUSES, AND ANAGRAMS.

1. To Mr. NOAH WILMOT: by Mr. D. ROBERTS.

Dear Wilmot, I've conn'd, with great satisfaction,
 Your friendly epistle to me lately written;
 And still will aver, without fear of detraction,
 In all *kingdoms* the biter will one day be bitten: 1
 For "I have been roaming," and often with wonder
 Have witness'd oppression usurp over reason;
 And sure as *potatoes* their own stalk *bow* under, 2, 3
 These *blades* will receive each a *smack* in due season. 4, 5
 Blackbearded oppression, I hate thee sincerely! 6
 Thou art the fell *spring* of sedition and treason; 7
 Twin brother to Beelzebub, who late and early 8
 With merciless fangs the unwary ones seize on.
 Thou worse than *tobacco* smoke *selfish* declaimer, 9, 10
 Whose face is an *index* to all that is base; 11
 Who snatches the *bread* from the merciful almer *ke* 12, 13
 At charity's dictates, and sneers in his face.
 And *ink-black* the deeds of the deep *bargain-maker*, 14, 15
 Who strives the weak *female* to cozen or cheat; 16
 With *beam* wrong adjusted, becomes the partaker 17
 Of infamy's portion, though snug his retreat.
 In *silence* I wonder at hated oppression, 18
 And *vow* I would send him below to the d—, 19
 In regions infernal to hold his possession,
 To *point* out the passage and dwelling of evil. 20

Opinion and precept are both unavailing ; 1
 The *churchyard* and *landmark* must both yield to *time* : 2, 3, 4
 The *mark* of the *garboil*, the *vagabond's* failing, 5, 6, 7
 Is *current* as *topmast* in every clime. 8, 9
 A *necklace* of hemp on a high raised station 10
 Would rightly denote the *title* they bore, 11, 12
 And *flow* like a *star* shot abroad through the nation, 1, 2
 While the *green* grass springs up in the path to their door. 3
 O how my blood boils while I am observing
 The *bookish* young stripling usurp over merit ; 4
 And *craftily* threaten the man most deserving, 6
 A *niche* in the temple of Mars to inherit. *use* 7
 I'd *beefsteaks* forego, and *May*-morning's pleasure, 8, 9
 Or e'en with a *termagant* fix my abode ; 10
 Or *climb* with a *bard* a whole day at my leisure, 1, 2
 A *riotous*, *evil*, and mountainous road, 3, 4, p 5
 Could I with a *halter* but tether oppression, 9
 And *stile* him a traitor, and give him a *stripe* ; 7, 8
 And *mate* him with Old Nick, by way of digression, 9
 To take his *reward* when he's perfectly ripe. 10
 And now, my dear Friend, as my absence prevented
 My writing to you of lunar transactions,
 I hope our friend Ninnis has well represented
 His Highness' opinion on parties and factions.
 Long, long may you live on the banks of your river,
 To give your reports on things that are passing ;
 In spite of opponents I'll join with you ever,
 While sinecure places and bribes are in fashion.

2. *An Address to the Editor of the Entertainer ; being an Answer
 to the Enigmas, Charades, Rebuses, and Anagrams : by
 NOAH WILMOT, S—s, near Newcastle-on-Tyne.*

Dear Sir, like a monarch of absolute sway,
 You have only to speak, and your subjects obey :
 You have order'd your lieges to grant you supplies,
 Which have pour'd in at once from the witty and wise.
 First, Baty has ransack'd each *kingdom* and *clime* E 1 and A 1
 With Beta and Clay, from the dawn to *bed-time*, C 4
 In search of fit subjects to turn into rhyme.
 Near the *churchyard* the latter you see on the road, C 2
 Bow'd down with the weight of his *potatoe* load ; E 3 and 2
 Which, in *Drab's* *opinion*, whose *beard* is not new, A 2, C 1, E 6
 By steam should be *cook'd*, when they get up to you. R 4
 He's a *blade* whose industry always secures E 4
 A *Garland* of very remarkable *flowers*. C 3, R 1
 Next Gove heaves in sight, with his *smack* trim'd and tight, E 5
 With Richardson's *bread*, quite a *bargain* for weight ; E 13, 15

These ladies, too, send you a *helpmate* for life, A 9
 And a *priest*, with his *inkstand* to make her your wife. A 8, E 14
 In beautiful *style* my friend Hope follows next, A 7
 With his present of *twins*, at which be not vex'd, E 8
 Nor think them an *evil*, for lucky's your lot, A 4
 And luckier still if a *trio* you'd got : A 3
 He embarks in your cause, as blythe and as bland
 As Hetherington's *spring*, when it blesses our land ; E 7
 And is destin'd, no doubt, though private his station,
 To shine a bright *star* in your fam'd constellation. R 2
 As you still smoke *tobacco*, 'friend Herdson has put E 9
 In his package a parcel of fine patent cut ;
 And pipes would have added, if he had not been
 In a haste to set forward to *Gretna Green*, R 3
 Where Perci King's gone, on the wings of love waft,
 To be join'd by old *Index* to fair Lucy *Craft*. E 11 and R 5
 A *vagabond* shackled, a hang gallows knave, C 7
 With a *hulter* to hang him should he not behave, A 6
 Are sent you by Lester, your old worthy friend,
 Whom in lunar affairs I was won't to offend :
 But now we'll *shake* hands, all our bick'rings decline, E 12
 And forget all that's past o'er a *beefsteak* and wine R 8
 By Roberts provided, and dress'd by his cook,
 A *female* quite fit to provide for a duke. E 16
 While he will his "voyages and travels" recount,
 "By flood and by field" what he's had to'surmount ;
 "The hair-breadth escapes" from the "dark rolling waves,"
Topmast high, like to *souse* all in watery graves : C 9, R 7
 What *reward* he has got, with the comfort of mind, A 10
 Himself in our "tight little island" to find E 10
 Again, safe and sound, where he'll *stop*, I am told, A 5
 And live at his ease on his *banknotes* and gold, C 11
 By his *science* in mining, in countries won, E 18
 Beneath the warm *beams* of a tropical sun : E 17
 Uniting with Sheridan, Starmer, and Smart,
 To support ENTERTAINER with hand and with heart.
 Poor Wilmot comes last, with a few *title-pages*, C 12
 To hand down your labors to far distant ages :
 A set of fine *vowels* he adds to the boon, E 19
 The value of which your first number has shown.
 The *termagant* wife and *garboil* you may spurn, R 10, C 6, R 9
 But they're only, like merchandize, sent on return ; R 6
 As goods sent on trial, and after survey'd,
 Found unfit for the *current* concerns of a trade : C 8
 For should all her efforts at usefulness fail,
 She'll still *point* a moral or garnish a tale. E 20
 I had almost forgot the *necklace* for your maid ; C 10
 And the *postmark* which shows you the postage is paid ; C 5
 Which closes the budget of wares for the year,
 And presages to you a most brilliant career.

ANSWERS TO THE QUERIES.

1st Query, answered by Mr. J. BAINES.

It is said, if the earth were not surrounded by an atmosphere capable of reflecting the rays of light, every part of the sky, except the spaces occupied by the sun, moon, and stars, would appear dark; that bodies placed in the shade of other bodies could not be seen; and that there would be an instantaneous transition from day to night at the setting of the sun. These assertions are, in some measure, conformable to the observations made by M. de Saussure on the top of Mount Blanc, where the rarity of the atmospherical fluid is about twice as great as at the earth's surface. For, there the ground of the sky appeared as black as ebony, though the moon and the planet Jupiter shone with the brightest splendour. Notwithstanding, infinite space seems to be perviable, at least, to rays of light entering the eye, as the stars may be seen at noon from the bottom of a deep well, for which purpose the wells in the observatories of Greenwich and Benares were made.

Again, by ENIGMATICUS.

Reasoning from analogy, I should imagine infinite space to be really transparent; else could we see the rays of light reflected from the more minute stars?

Again, by Mr. J. HERDSON.

Infinite space is not really transparent, and the following circumstances prove that the ground of the sky is entirely black. It is well defined by optics, that the red solar rays penetrate through the atmosphere, while the blue rays, less able to surmount the resistance which they meet, are reflected or absorbed in their passage; and it is to this cause that we ascribe the blue colour of the sky, and the bright azure which tinges the mountains of the distant landscape. And as we ascend in the atmosphere, the deepness of the blue tinge gradually dies away; and to the *aeronaut* who has soared above the denser strata, or to the traveller who has ascended the Alps or the Andes, the sky appears of a deep black, while the blue rays find a ready passage through the attenuated strata of the atmosphere.—See *Library of Useful Knowledge*, Optics, page 65.

3d Query, answered by Mr. J. BAINES.

The allusion made by Hector is to the Grecian custom of taking omens from the flight of birds. He had just been admonished by Polydamas, that

Αἰετὸς ὑφ' ἡμέτερας, ἐπ' ἀρκετὰ λάβη κρητὸν,
 φοιτῶν τα δραπετὰ φέροντο γαῖαν, πίδαται,
 Ζῶν ἀφαρ δ' ἀφίκετο.

Ib. xii. 219.

which he is determined to disregard, to trust to his own valour, and follow the dictates of Jupiter. It is certain, from several passages in profane authors, that the Greeks, in taking omens, always turned themselves towards the north; and the Romans stood with their faces to the south. In either case, the eastern was considered the propitious quarter; for which Varro assigns as a reason, *A decrum sede cum in meridiem spectes, ad sinistram sunt partes mundi exorientes*; and Pliny, *Quoniam læva parte mundi ortus est*.

Again, by Mr. J. BATT.

These words of Homer allude to that custom among the Greeks of foretelling future events by the flight of birds.

Again, by Mr. J. HOPE.

This passage alludes to the custom which prevailed amongst the Greeks, and afterwards amongst the Romans, of divining the issue of future events from the flight of birds. A bird on the left hand was considered as *lucky*; one on the right, *unlucky*. In like manner, a bird flying towards the west was looked upon as *a favorable omen*; but one flying towards the east *the contrary*. In the words immediately preceding the passage in question, we find Hector, about to fall on the Grecian ships, admonished by Polydamas as going in the face of an unlucky omen—a right hand bird:

Αἷτος ὑψίπαις ἐπ' ἀριστερά λαόν ἱερών
Θοῖνεν τὰ δράκοντα φέρει δ' οὐχέσσι πτελῶρον.

But Hector replied with indignation, declaring that he did not value such omens—that this one omen was the best:—

Εἰς εἶδος ἀριστος ἀμυνεσθαι περὶ πατρὸς.

3d Query, answered by ENIGMATICUS.

There is very little doubt but the light and elegant style of building, whose principal and characteristic feature is the high pointed arch struck from two centres, was invented in this country. That it was here brought to the highest state of perfection, is certain; and the testimonies of other countries, whose national traditions ascribe their most beautiful churches to English artists, adds great weight to this assertion; although Sir C. Wren ascribes its origin from the Saracens. Grey, the poet, supposes the idea of it to have arisen from the intersection of two round or Saxon arches. With such diversity of opinion it is impossible to fix any exact date to its invention; but, supposing it to be

of English extraction, we may not be much in error if we fix it between A.D. 1170 and 1180.—For many interesting particulars respecting this subject, see the *Introduction to the Beauties of England and Wales*.

Again, by Mr. J. HOPE.

The Gothic style of architecture, properly so called, was first used by the Goths in their own country, but at what period is uncertain. It was massy and irregular, strength being the point to which they chiefly attended. When Italy was overrun by these barbarians, they introduced their own mode of building, adopting part of the Roman architecture by way of improvement. I may here observe, that the manner of building now generally called Gothic, may be fairly questioned as to its Gothic origin. The Goths had no such fine ornaments and splendid decorations as appear in our cathedrals, and in the beautiful buildings of this kind which are found abroad. This style of architecture may, I believe, be traced to the plains of Asia, and ought to be properly denominated Saracenic. It was first introduced into Europe, from the Holy Land, by the crusaders, in the reign of Henry the Second, and is supposed to owe its rise to the Arabians. On its first introduction it was greatly admired, and many edifices were torn down and rebuilt according to its models.

4th Query, answered by Mr. J. BAINES.

The English preposition *after* has the force of *according to*, and is equivalent to *ad*, *de*, *in*, &c. in the Latin. *Pellibus in morem cincti. Virg.* *Minos leges sanxit de Jovis sententiâ. Cic.* The Greek prepositions *ἐν*, *ἐπί*, *ἐκ*, *ἀπό*, *κατά*, &c. in some senses, also correspond to it. *Σὺν ἡμεῖς εἰς τὸν αἰῶνα κατὰ τὴν τάξιν Μαχίονος.* *Heb.* vii, 21. *Συν τῷ νομῷ.* *Xenoph.* Hence the word “*after*” is strictly correct in the passages alluded to. “*Prevent us in all our doings,*” must be understood in the *doing of evil* only.

Again, by Mr. J. BATY.

The preposition “*after*” appears to be used here in the sense of the Latin *secundum*, which signifies *according to*; and the sentences (I think) would be better if they were altered, for *prevent* is now obsolete in the sense in which it is here used.

Again, by Mr. J. HOPE.

As I understand these passages, there is no impropriety. *After* is here used in the sense of the Greek *κατά*, or the Latin *secundum*; hence it means *according to*; and in this sense we

entreat the Lord not to deal with us according to the strictness of justice on account of our sins, but to be a God of mercy through Christ; not as the author of the law, but the giver of the gospel. *Prevent* is now obsolete in the sense here used. It comes from *prevēnio*, and means *come before us*; that is, stir us up or assist us with thy grace in all our actions, &c.

Again, by Mr. M. PAXTON.

If the sentences be read (as they perhaps ought to be) "O Lord, deal not with us *according to* (or after the manner of) our sins; neither reward us *according to* our iniquities:" and "*Conduct us in all our doings,*" &c. there would be no impropriety in the mentioned expressions.

5th Query, *answered by Mr. J. BAINES.*

By *oepia*, sapientia, or wisdom, is to be understood a prudent management of life, both as regards its temporal and final interests, and in this sense Prov. iii, 17, is indisputably correct; but *γνῶσις*, scientia, or knowledge, by which the latter verse in the concluding part is explained, signifies scientific and literary erudition, which is well known to be "a weariness of the flesh," even if it do not render the mental faculty altogether so delicate as to make life a burden to its possessor.

Again, by Mr. J. HERDSON.

Wisdom, in the passages referred to, must be taken in two very different senses; the knowledge of *divine* and *human* things: the fear of God is the beginning of wisdom (Prov. ix, 10); and *her ways are ways of pleasantness, and all her paths are peace.* (Pro. iii, 17). Human or worldly wisdom is mere speculative knowledge, wherein every enquirer must be disappointed who seeks for a more intimate acquaintance with the works of nature than human powers can penetrate; for, "of making many books there is no end, and much study is weariness of the flesh" (Eccl. xii, 12). And Solomon was perfectly acquainted with both kinds of wisdom. For God gave him wisdom and understanding which far exceeded the wisdom of the children of the East country, and all the wisdom of Egypt (1 Kings v, 29, 30); yet *he found that in much wisdom is much grief, and he that increaseth knowledge increaseth sorrow* (Eccl. i, 18).

Again, by Mr. J. HOFFE.

In the passage in Proverbs, Solomon is speaking of the worth and advantages of that wisdom which consists in the knowledge of

true religion. In that in Ecclesiastes, he is, on the contrary, setting forth the wisdom which arises from things merely earthly : hence the reconciliation is manifest ; since the one is accompanied by peace of mind, and will be followed by a glorious and eternal reward ; the other is attended by much "weariness of the flesh," and has its reward within the compass of this short period of existence.

6th Query, answered by Mr. J. BAINES.

Oxygenized muriatic gas possesses an uncommonly suffocating odour. It is absolutely non-respirable : animals exposed to it die instantaneously. It may be easily procured, and in great abundance, by putting one part of powdered black oxid of manganese and three of concentrated muriatic acid into a retort, connecting the retort with a pneumatic trough, and receiving the gas over water in the usual manner. Therefore, it is only necessary to fumigate an apartment with this gas, and all the crickets and beetles in it will instantly die.

Again, by ENIGMATICUS.

A very effectual method of destroying these insects is by the application of oil, pouring it into their lurking places, &c. : these and other insects, if covered with it, and in some instances only touched with this liquid, are sure to die.

7th Query, answered by Mr. J. BAINES.

My own observations on the subject of this query have left an almost indelible impression on the mind, that all epizotic rocks, in which animal and vegetable exuviae are found only, have been formed by sand, which at the time of organization was at the bottom of the sea. The red sand rocks on which Everton and Walton, near Liverpool, are situated, are formed of regular layers of sand, containing relics of the ocean, as if washed on shore by the tide, though they are elevated about fifty yards above the present level of the Irish sea. The sand rock near Tickhill, and that on which Nottingham is built, are each of them plentifully incorporated with marine remains ; and what is particularly surprising, below the latter a regular stratum of the natural surface-soil of the adjacent low lands is found. In the quarries and mines in the neighbourhood of Leeds many impressions of various parts of aquatic animals, and correct representations of the foliage of plants, especially ferns, are to be met with. In these lithographic delineations may be traced plants from the tropical regions, North American ferns, and, in my opinion, British *vacinia*. The limestone crags of the north of Derbyshire, and of

Bredon Hill in Worcestershire, which in elevation are eight or nine hundred feet above the plains, and are almost saturated with sea shells, seem to be of a more ancient formation than the sand-rocks above-mentioned. That the world in which we now live has at some period been one immeasurable ocean, admits of very little doubt to a rational creature; and that a terrestrial world, before the one of waters, must have existed, which the numerous remains of animals and vegetables found in different countries, and not belonging to the present period of animated existence, incontestibly prove.

Again, by C. N.

There are many hypotheses which might be adduced seemingly to explain this remarkable phenomenon; but I think the most probable one is, that the sea once covered the places where those exuviae are found, and when it receded, they became immediately covered with earth, &c. before putrefaction could possibly take place; and this might have happened from some great convulsion of nature.

Again, by ENIGMATICUS.

It is the commonly received opinion, that the general deluge alone can account for the appearances mentioned in the Query.

Again, by Mr. J. HERDSON.

Penrose, in his Letters, gives it as his opinion, that the centre of gravity and attraction was altered at the time of the deluge, and by the breaking up the fountains of the great deep, which took place at that time (Gen. vii, 12), that the earth, rocks, stones, &c. which were previously kept or bound together by gravity, or attraction of cohesion, would, by the efflux of the waters, be dissolved or reduced to their smallest parts; while, on the contrary, shells, bone, shrubs, &c. which are not held together by gravity or attraction of cohesion, but by fibres, sinews, tubes, and membranes, tied, twisted, and complicated together in a wonderful manner, would not be affected by it, and therefore would afterwards, as the waters subsided, mix with the strata and stones in which they are now found, and will therefore prove, to the latest posterity, that Moses' history of the flood is true.

8th Query, answered by Mr. J. BAINES.

According to the principles of reflected light, the image of a right-lined object placed before a circular reflector, under certain circumstances, is an ellipse, having the luminous body in one of

the foci. This is precisely the case with the flame of the candle, whose sections parallel to the base are circular, and are to be considered in the image as the reflecting body, and the scratches the objects reflected. Hence the latter are ellipses surrounding the former, and, if the distance of the object be great, they will not deviate much from circles.

9th Query, answered by Mr. J. HERBSON.

In the year 1649, George Fox, the founder of the sect called *Quakers*, was imprisoned at Nottingham, for having publicly opposed a preacher who had asserted, that the more sure word of prophecy, mentioned 2 Pet. i, 19, was the Scripture—George Fox declaring that it was the Holy Spirit; and when on his trial, one of the justices scoffing at him for having bidden those about him *tremble at the word of the Lord*, gave to his followers the name of *Quakers*; but they themselves adopted the endearing appellation of *FRIENDS*.—*Evans's Sketch*.

Again, by Mr. M. PAXTON.

The Quakers first appeared in England about the year 1650. Their founder, George Fox, was confined in 1649, for having publicly opposed a preacher who had asserted that the more sure word of prophecy, mentioned in 2 Peter i and xix, was the Scripture—George Fox declared that it was the Holy Spirit; and in the following year, 1651, being brought before two justices in Derbyshire, one of them, scoffing at George Fox for having bidden him and those about him tremble at the word of the Lord, gave to them the name of *Quakers*, an appellation which soon became and has remained their most usual denomination; but they themselves have adopted the appellation of *Friends*.

10th Query, answered by Mr. J. BAINES.

The basis of all acidity is oxygen, though several acids exist ready formed in the fruits of many vegetables. Citric acid exists in the juice of lemons and oranges, in unripe grapes, cranberries, and bilberries; and the malic acid in the juice of unripe apples, barberries, elderberries, gooseberries and plums. Now, when fruit is bruised, its interstices are laid open, and consequently the acids exposed to the air, under which circumstance, one property, and particularly of the malic acid, is, that they spontaneously undergo a gradual decomposition. Hence the acidity is evidently lessened by the disengagement of the acids which caused it.

Again, by ENIGMATICUS.

By bruising unripe fruit, a vinous fermentation is occasioned, by the minute mixture of the acid with the pulp of the fruit, which, of course, will ameliorate the taste of it.

11th Query, answered by Mr. J. BAINES.

In the heating, or what the Yorkshire farmers call the sweating, of hay, the evolution of carbonic acid gas, and the absorption of oxygen gas, is proportional to the deficiency of dryness at the time of stacking. When combustion takes place, it is entirely owing to the condensation of the oxygen gas which has been imbibed; as this gas, sufficiently condensed, is capable of setting fire to any thing.

Again, by Mr. J. HOPE.

Hay stacked green contains a considerable quantity of moisture. In consequence of this fermentation takes place. Now fermentation is always attended with heat, which, when a large quantity of green hay is put together, rises to a great degree. It does not, however, always burst into flame, as I have seen hay-stacks completely blackened, and reduced, as it were, to a cinder: but when by any means external air is admitted when it is in this high state of heat, ignition immediately takes place, and the hay is consumed.

12th Query, answered by Mr. D. ROBERTS.

The *botworm* is produced by a fly much resembling a common bee, but smaller, which are seen teasing horses in the summer months. This fly deposits its eggs on the horse's hair, more particularly about the neck and shoulders, in places where the horse cannot reach to bite. These eggs have the appearance of nits on the human hair. I had often read many absurd accounts of the generation of the *botworm*, some of them too ridiculous to be mentioned, but none of them in the least satisfactory; therefore in the spring, when the bots made their appearance, I took ten of them, which I inclosed in paper in such a manner as not to injure them, and placed them in a large rummer, over which I put a saucer, so as to admit air, and placed it in a window where the sun shone only in the afternoon. In about a week I examined those papers, and found the worms had taken a new form, and were become *crysalis*. These I deposited again as before, and examined them several times at about a week apart, and they still retained the same appearance till about the middle of June, when, on examining them, I found two of the flies had burst their shells, and

were strong and active. I afterwards attended to the others daily, and in the course of a week found seven others: the tenth did not come to perfection—probably I had injured it before I put it into the glass. Hence it is obvious, that the horse by biting itself or other horses (as they often do when together), detaches the hair to which the eggs adhere, which, getting into his mouth, is afterwards swallowed with his food, and the eggs are hatched in the stomach, to the coat of which the *bots* adhere with astonishing vigor, and feed on the blood; and therefore the poisons which kill other worms who feed on the chyle, have no effect on the *bot*. When a horse is to be put to grass, a few drops of oil of tar, rubbed about his neck and shoulders, will keep off the fly from settling there; and two or three smart purges directly after the horse is taken from grass for the winter, will probably have the best effect in carrying off the bots from the stomach, before they gain strength or maturity, and is the most likely means of getting rid of these troublesome and dangerous plagues to that noble animal. Horses kept in stables during the summer very rarely have any *bots*. While I was in Mexico I never noticed any horse to have *bots*, nor did I ever see any of these nits on the horses, or any of the abovementioned flies, although I was very particular in my observations.

*Want of room obliges us to omit answers to the following Queries:—*3, 9, 12, *by Mr. BAINES*; 1, 3, 5, 7, 9, 10, 11, *by Mr. BATY*; 2, 4, 5, 8, 9, 11, 12, *by ENIGMATICUS*; 4, *by Mr. HERDSON*; 1, 6, 7, 8, 9, 10, 12, *by Mr. HOPE*; 7, *by Mr. MAFFETT*; 3, 6, 7, *by Mr. PAXTON*.

NEW ENIGMAS.

1st Enigma, by Mr. J. BAINES.

Chronologers do not agree
 What nation first presented me,—
 Enslav'd a human creature;
 Perhaps in Chaldaea's land, of yore,
 I watch'd the beck of some old boor,
 Of grim, unfriendly feature.

In Egypt, if by chance my birth
 Was nurs'd on Nile's prolific earth,
 I shar'd some dire disasters:

The Copts were rude barbarian men,
Of human mould, 'tis true, but then
The puny fry were masters.

The lib'ral sons of ancient Greece,
Whether in active war, or peace,
Abstain'd from tyrannising;
And Socrates, immortal sage!
Without me curb'd the rising age,
All harsh restraints despising.

The savage hordes from Tyber's banks,
Who play'd in war such wond'rous pranks,
And murder'd Archimedes,
Would not refrain'd, had I been there,
T' have cast a most disdainful sneer
On one whom scorn the meed is.

But all the ills of ancient days
Are nought; compar'd to modern ways,
By which some men degrade me;
Take from me all effective force,
And then, when business lags, of course,
Contemptuously upbraid me.

And when the pertinacious clan
All order break, and mischief plan,
Which frequently the case is,
They're not to blame; and I, whose sway
Amounts to nothing ev'ry way,
To combat vice my place is.

Though I in science know much more
Than Newton, and in classic lore
With Parr and Porson vying;
My talents must be rated low,
To let my nam'd superior's glow,
Though dull as embers dying.

2d Enigma, by Mr. H. CLAY.

Belov'd Associates! fair Scientia's train!
The Muse once more presents her annual strain;
And hopes to gain, as she has gain'd before,
Your kind attention to her mystic lore.
See fair Rosetta for the ball prepare,
With brilliants deck'd, in ringlets waves her hair;
Her azure robe, from far-famed India's loom,
In folds descends, and sweeps along the room;

While ev'ry ornament, with judgment plac'd,
 Proves she possesses genius and taste :
 Her glass informs her, too, without disguise,
 She'll move a goddess in her lover's eyes.
 Her coach is call'd—impatient of delay,
 She leaves the room, and hurries on her way.
 Whence is that loud lament? Frowns cloud the brow
 That wore the livery of smiles but now;
 Warm from her cheek the spreading blushes rise,
 And hated anger flashes from her eyes;
 For, turning quick, with rage, and grief, and pain,
 She sees me following, flaunting in her train:
 Me she disdains, and is resolved that I
 Shall never travel in her company ;
 No—now she stays at home, quite out of spite,
 And spreads in sullen sulkiness the night.

Yet, though I'm by Rosetta so despis'd
 I am by thousands valu'd high and priz'd ;
 For want of me has plung'd in deep distress
 The houseless widow and the fatherless.
 For me the peasant nerves his arm to toil ;
 For me the oxen turn the fruitful soil ;
 For me, confin'd within his little room,
 The pale mechanic plies the useful loom ;
 By me the lords and nobles of the land
 Ensure obedience, and obtain command,—
 Their horses, hounds, their pomp and revelry,
 Are all supported and upheld by me:
 'Tis I who aid them in their foreign tours,
 And am the spirit of their vile amours.

Conversion's now the order of the day,—
 Some change from principle, and some for pay ;
 While to my creed with constancy I stick,
 And am a downright Roman Catholic.
 And though some Protestants have rack'd me sore,
 They but increase my interest the more.
 But here the Bard concludes his simple tale,
 For I'm apparent in the flimsy veil
 That he has wov'n (ah, what a thin disguise !)
 To screen me from your penetrating eyes.

3d Enigma, by Mr. T. CROSSLEY.

Enigmatists, a moment lend
 Unto a true and useful friend,
 Who, I believe, has ne'er yet been
 In enigmatic garments seen ;

Therefore, dear Gents. I think it right
 His virtues should be brought to light.
 The theme which here I humbly bring,
 Was once subservient to a king,—
 A king, the pride of Britain's isle,
 On whom fair science deign'd to smile,—
 A king, who once on Albion's plains
 Routed the fierce invading Danes ;
 Whose life and fortune always stood
 Devoted to the public good.
 Hist'ry has said that he first brought
 My hero forth—but this I doubt ;
 For, search the Scriptures and you'll see
 That mention there is made of me.
 Of various sizes I am found,
 And may be either square or round,
 Globose, octangular, or still
 What pleases best my master's will.
 Now you'll perceive that I'm design'd
 To be a friend to all mankind ;
 To ambulate the streets at night
 And put designing rogues to flight ;
 Along life's gloomy path to show
 The way which erring man should go.
 My shapes, as I have said, are many ;
 And, mind, I'm not confin'd to any ;
 Proteus himself I can defy
 To show so many forms as I.
 A man, a fish, a bird, a beast,
 You may perceive in me at least ;
 Nay, for a ghost, by many a clown
 I frequently have been set down !
 But change the story, and you'll see
 Far different work reserv'd for me.
 Important duties I perform,
 Expos'd to many a wintry storm ;
 In dangerous places oft attend
 And am the seaman's steady friend.

4th Enigma, by ENIGMATICUS :

In which all Last Year's Enigmas are answered.

Most respected Associates,—Without preamble or preface,
 I bluntly intrude myself into your company ; will tell you a few
 of my accomplishments, and throw myself upon your generosity
 for your favours. I assist greatly in building a city, and planting

potatoes ; without my aid you would be extremely awkward in making a *bow* ; can wield a *blade*, and *transport* a parcel from one place to another, however distant ; can shave your *beard*, or *spring* a rattle ; am sometimes by myself, but mostly with a *mate*, my *twin* brother ; can plant *tobacco* ; am an excellent *index* ; the fiddler without my assistance could never produce a *shake* ; can make *bread*, polish an *inkstand*, *bar*, and bolt with *female* neatness and expedition ; can adjust a *beam* in the truest manner ; can — in short, I have many other peculiar qualifications ; but having given so many specimens, I shall make a *point* of stopping here, and in *silence* and obedience await your answer.

5th Enigma, by Mr. C. GILL, Seamer, Scarborough.

Associates, come list to the lay that I sing,
And a stock of good nature and patience pray bring ;
For how great the attempt, and how arduous the task,
To paint to your critical eyes such a mask
As shall veil my odd name, yet describe my odd nature,
And figure my form, while it shadows my feature.

Since pedigrees now into fashion are grown,
I would fain risk a couplet to trace you my own ;
But, alas ! what avails it to spin out my tale,
Since to prove a patrician descent I must fail :
For I spring from the dregs of inanimate matter,
And may have lain cent'ries yards deep in ditch water ;
I may have been form'd from the grove or the rock ;
Am the finest of marble, a stick, or a stock ;
The pride of the forest I once may have flourish'd,
Or in a hedge-bottom for years have been nourish'd.
Yet, " Man has found out a great many inventions,"
And who shall but fathom his weakest intentions ?
Imagine this king of creation—this worm,
Created in dust, but in majesty's form,
Descend from his dignified state, and to me,
His inferior, the work of his hand, bend the knee !
Exalted on high thus by man in his dotage,
My reign has been wide from the throne to the cottage.
But the pure light of knowledge shall rise o'er the lands,
And from man, so degraded, unfetter my bands ;
From his reason dispel the dank mists I have spread,
And banish me hence to the realms of the dead.
Away with reflection ! for, once more I live ;
I live with the fair one, and pleasure I give ;
With transport she views me, I hang on her breast,
And the treasures of Ind. would not me from her wrest !

Behold me again in yon mansion retir'd,
An emblem of something much lov'd or rever'd;
My use, to embellish some edifice gay,
Or to "tell future ages the deeds of a day."
To transmit the fame of some warrior of old,
Or a tale of true love that in fiction is told.
Should you question me now—"Why, what are you like?"
All the answer I make is—"Why, just what you like!"

6th Enigma, by Mrs. C. GILL.

Gents. and Ladies, why should I
The riddling muse refrain to try?
You contribute to my pleasure;
Why should I not use my leisure,
Attempt the pleasing debt to pay,
And, fault'ring, sing my lowly lay.

Vile pretenders! hence, and see
Your paltry work, compar'd with me!
I tell many a pleasant story,
Bring the mighty dead before ye;
Make dumb matter speak, and raise
The wond'rous deeds of other days.
Oh martial fame, or genius' glow,
Can immortality bestow!

Ladies fair, on you I wait;
Beauty's charms I renovate;
On your toilet I attend
Ere to ball or rout you wend;
Dress your hair, or kiss your hand,—
Sure I am a magic wand.

Autumn gilds the landscape wide,
Teams with life, and joy, and pride;
Ceres opes her plenteous hand,
Sheds her bounties o'er the land.
Hark! the huntsman's cheering note,—
Echo lengthens the report;
Hark! the deep-mouth'd beagle cry:
Speed thee, Reynard! speed, or die.
Mirey valleys, stony hills,
Flooded rivers, deepen'd rills,
All are distanc'd—wends he on,
And many a weary mile he's won;
Still close at his heels I fly,
And foremost in at death am I.
Gents. and Ladies, name me now,—
Permit me then to make my bow.

7th Enigma, by Mr. J. HERDSON.

Without preamble or a long preface
I boldly come, in hopes to gain a place
In ENTERTAINER'S enigmatic page,
Where mystic themes the leisure hours engage.
In former days, the ancients knew me well,
Before old Sodom and Gomorrah fell ;
In Jacob's early days, too, I must own,
I was to Joseph and his brethren known ;
And from that period, through each age and clime,
I've been a snare, or punishment for crime :
And now, behold what numbers round me crowd,
Of high and low, to see a pastime rude ;
Where burning ardour captivates the whole,
And gambling reigns without the least controul.
To me another class of people throng,
For recreation, lov'd by old and young ;
Where they behold the scenes of former days
Brought home before them in ten thousand ways.
Now change the scene, and from my ample store
I yield a comfort both to rich and poor ;
And when keen winter holds his surly blast,
My welcome store is held in great request.
In many trades I'm very useful, but
What I produce is trampled under foot.
The skilful farmer, by industrious toil,
From my rich store improves his barren soil.
Enough, dear gents, is surely now unfurl'd
To tell my name to all the list'ning world.

8th Enigma, by Mr. J. HUTCHINSON.

The post's arriv'd, and Farmer Brown
Is call'd on bus'ness up to town,
And such the urgency and haste,
That John must not a moment waste,
But to the outer gate repair,
To stop the coach and take a fare ;
While Kate's employ'd preparing me,
Companion of his ride to be.
But ere I'm ready John returns,
Whose visage with impatience burns ;
While " quick ! " he cries, " 'tis at the gate,
And Coachee says he cannot wait ! "

"What must be done?" old Brown rejoin'd,
"A moment more, I'm left behind!"
And he is gone to buy or borrow,
Unless I can be sent to morrow.
Yet though I'm left at Farmer Brown's,
Both in his house and on his grounds,
He often sees me on the way,
'Mid rural landscapes fair and gay.
But as the city draws more nigh,
I seldom greet his wand'ring eye;
Yet, when arriv'd where cocknies swarm,
I'm seen again, though chang'd my form;
And, cockney-like, am often drest
In many a gaudy colour'd vest;
But no reflection or reproach,
For I may yet be on the coach;
Which at the inn now makes a stand,
Where, kindly taken by the hand,
I due attention do receive,
Until the motley crowd I leave.

But, to return to Farmer Brown,
Who, like myself, is now "set down:"
When several days had seen him through
The business which he had in view,
He's tempted, in a vacant hour,
To visit London's famous tower,
Where long his wond'ring eye he feasts,
But most admires the foreign beasts;—
And well he may, for in a den,
Behold he meets with me again!
Compos'd of living flesh and blood,
Whom few opposers have withstood.
But leaving now our country friend,
To draw my story to an end:—
I was with Noah in the ark,
Yet may be found in wood or park;
And though it has just hinted been
That I in gaudy garb am seen,
A russet dress I often wear,
At other times a coat of hair;
Which, whether mixture, brown, or black,
Is tightly button'd on my back;
From which, no doubt, you'll get a clue,—
So, enigmatic bards, adieu!

9th Enigma, by Mr. PERCI KING, Northumberland.

As when some old and ponderous machine
 Has been disus'd, and long cast by unmov'd,
 Its joints breed canker, and its timbers rot,
 Till, when once more requir'd, it will not stir
 Without a double force—e'en then deep groans
 Proclaim the inward grinding of its bars;
 It jolts and screams with din unheard before,
 As though some murd'rous hand asunder rove
 Internal wheels: so with the ancient bard,
 Whose head is stunn'd by unexpected blows
 Of adverse fate. Long time he grov'ling lies
 In sullen silence and in dark despair
 Of ever rhyming more; till some strong hand
 Forth drags him quickly from the stupid clay.
 Some power is then invoc'd to whirl him round,
 Till, warm'd by friction, and its cure applied,
 Again he tries to manufacture verse.

Old Vulcan, now be near: thy brawny arm
 In silence tells thy strength and nervous grip.
 Thine ever-yawning throat, down which thou'st pour'd
 Full many a foaming kilderkin, is still
 Insatiate as the gulph that knows no bounds,
 But swallows all, and yet would swallow more.
 Pray tell when first from thy black cave I came?
 Thy cave grew blacker at my birth,—the powers of din
 Were stunn'd and deafen'd with reverb'rous sound,
 Till thund'ring Jove refus'd to listen more.
 I left thy dark domain, and since have been
 A strolling vagabond, a wanderer wide:
 Behold, the gaping crowd, when I approach,
 Gape wider still, and with vociferous might
 Proclaim the loud *huzzas*!—a hero comes,
 Who drench'd with human gore the thirsty earth.

Hush, master! pray now smooth thy rugged verse,
 And count thy numbers, nor annoy the ear
 Of him who listens to the tuneless song.
 Survey me on the green: each village swain
 Admires my graceful form and silent pace.
 Along the level plain I swiftly move,
 Till o'er the brink I tumble into ruin.
 I've grac'd the ball-room and the king's gay levee:
 There wond'ring crowds have felt my magic power;
 The raptur'd pulse beat quicker, and the nerves
 Of youth did thrill with rapture erst unfelt.

Not now so much in vogue, Lucinda shines
With greater lustre on a smaller sphere.

Now listen to the moralizing sage:
He reasons on a truth too often prov'd,—
That all below is worthless, false, and vain:
A bursting bubble, unsubstantial film,
A line that terminates. Ah, vain his logic!
For one sight of me will shew it false,
And prove eternity.

*10th Enigma, by Miss E. A. RICHARDSON, Vauxhall
Street, Vauxhall.*

I'm to warriors the source of both pleasure and pain,—
I've led them to glory, I've led them to death;
Such destruction I've wrought with my musical strain,
Where many a hero has yielded his breath.

The third of a race of fam'd trav'lers am I,—
With the last storms of winter am commonly seen;
Yet ere I depart (for, alas! all must die),
Young Nature is rob'd in her mantle of green.

Perhaps you will say 'tis all folly and pride,
Like a Welchman, to boast of my high pedigree;
To the great god of war I am nearly allied,
And I once, mighty Cæsar, was fatal to thee!

Ye sons of Bellona, attend on my call
Till the banner of victory proudly ye wave;
And if in the ardour of battle ye fall,
I shall breathe a lament o'er each warrior's grave.

11th Enigma, by Mr. D. ROBERTS.

Hail, Asia's spicy groves and balmy plains,
Where Flora's tribe in sweet profusion reigns;
Whose spreading plains are cloth'd in richest dresses,
And each grand mountain has its cool recesses
For calm retreat and contemplation meet,
With limpid streams to bathe the trav'ler's feet;
Where fruits delicious load the bending trees,
And lowing kine yield milk, and humming bees
Honey collect from ev'ry fragrant flower
That decks the plain or ornaments the bower:
'Twas in these regions that I first appear'd,
And by mistaken man was much rever'd.

Not majesty itself had such renown,
 For know, I oft presid'd o'er the crown :
 Though born of parents of a low degree,
 Yet mighty monarchs often bow'd to me.

When *Israel* march'd through a foreign land,
 A mighty numerous and high favor'd band,
 From Egypt just escap'd—a cloud their guide,
 Hemm'd in by *power divine* on ev'ry side,
 In all their murmurings had their wants supplied—
 By water from the flinty mountain's side,
 By quails, by manna ready at their door,
 Yet still did they their wand'ring state deplore,
 And summon'd me,—Ah ! sad mistaken race,
 Both they and I soon suffer'd foul disgrace.

I'm not alone to Eastern climes confin'd,—
 Nearer at home I'm intimately join'd
 To many a plodding swain, to high and low,
 Who many a favor do on me bestow
 Unthought of. Still I am ador'd by some
 Who will forsake their children, house, and home
 In search of me : impell'd by empty fame
 I all their passions furiously inflame ;
 Prompt many a hardy tar to cross the seas,
 In hopes to share my smile or gain my praise ;
 But disappointment often sours their faces,
 When I elude their over fond embraces.

Mankind, by me decoy'd, attendance dance,
 And to my levée different ways advance :
 The lover thinks he's in my presence blest ;
 The miser keeps me lock'd up in a chest ;
 The sportsman finds me 'midst his steeds and hounds ;
 The farmer keeps me feeding on his grounds ;
 The parent finds me in a darling child ;
 The wise and foolish are by me beguil'd.

Ye favor'd few, who each revolving year
 Delight to make dark secrets plain appear ;
 Withdraw the flimsy veil which hides my face,
 And shun my ways, nor suffer foul disgrace.

12th Enigma, by Mr. J. RICHARDSON, Etal, near Berwick, Northumberland.

While summer suns with mildest influence spread
 The fruitful herbage o'er the verdant mead,
 When eastern skies proclaim advancing-day,
 And pendant dewdrops dangle on the spray,
 Or when descend the soft refreshing showers,
 To deck with robes of green the shady bowers :

You then behold me, if perchance you pass
Along the heathy lawn or verdant grass :
There I might spend my days in peace and ease,
My sole employment my own taste to please ;
There I might feed on sweets without compare,
My breast a stranger to corroding care,
Did not proud man, the tyrant of the earth,
Transmit me from the spot that gave me birth ;
His pleasures to enhance I'm prisoner ta'en,
And borne in triumph off the flowery plain :
Oh, sad reverse ! now sever'd from my home,
By force compell'd to pine in dungeon's gloom ;
And forth to light by man at pleasure brought,
Maltreated, mangled without fear or thought.

But I midst other scenes am known to dwell,
Secure from danger in my peaceful cell ;
Endow'd with magic power I there impart
Reviving cordial to the sickening heart ;
To luxury my willing aid I lend ;
At other times I merriment befriend.

My nature chang'd, behold I ruin spread,—
Both rich and poor my hated presence dread ;
To drive me hence each artifice they try,
And view my ravages with tearful eye :
But I will close, and leave you to proclaim
On next ASSOCIATE's page my well-known name.

13th Enigma, by Mr. T. ROBERTS.

Hail ! hail, immortal nine ! my breast inspire,
"And grant one spark of your celestial fire ;"
My feeble pen assist as it portrays
A blooming chaplet in my hero's praise.
And thou, oh memory ! thy aid impart,
Strengthen my waning mind, and animate my heart.

When chaos dark was first brought into form,
From it I rose all nature to adorn ;
In Eden's blissful garden I was placed
Ere Adam's God-like form its bowers grac'd.
When brilliant Sol, with golden lustre crown'd,
Sheds his enliv'ning beams on all around,
When flow'rets gay bedeck the verdant plain,
And dormant nature sweetly blooms again ;
When in the budding groves the songsters sing,
And sporting lambkins frolic in the spring,
I do appear, in radiant splendour drest,
And in my sweet perfection stand confest.

The warrior bold I oft have forc'd to yield;
 For me he oft has left the blood-stain'd field.
 How great's my force! no whizzing balls more sure,
 Or no disease more difficult to cure
 Than that I bring upon the youthful swain,—
 For me he lives in anguish, grief, and pain;
 I do in *Clay's* soft numbers sweetly shine,
 And silently proclaim his muse divine.
 When peals of rumbling thunder rend the air,
 And through the blue expanse fork'd lightnings glare,
 Array'd in awful grandeur then I rise,
 And shine amid the gloomy, deafen'd skies.
 All own my mighty sway, the young, the old,
 The lively Frenchman, and the Briton bold;
 The rich, the poor, the monarch, and the slave
 To gain poor me do many dangers brave;
 Yet I'm as transient as the passing wind,
 That leaves no vestige of its form behind.

14th *Enigma*, by Mrs. RICHARDSON, *Vauxhall Street*,
Vauxhall.

Let poets swell the sweet delusive lay,
 That melts the soul, and leads young hearts astray,
 And paint the fair with all the witching graces
 Of lovely shape and mien, and pretty faces;
 Or plant the hero on the list of fame,
 Or chaunt a requiem to his deathless name;
 And many a subject choose, with hopeful pride,
 To gain their own sweet selves a name beside;
 So bards of old, with prophecies aslant,
 Rul'd wond'ring man;—but *we* are all extant:
 To war and love we powerfully belong—
 To piety and praise, and holy song:
 Of high extraction we, yet stoop to teach
 Mankind, and prophecy, and plead, and preach.
 With fervent zeal incessantly we pray
 For man's eternal rest, and point the way.
 Man is by nature ignorant and frail,
 But, should apostacy and wrong prevail,
 We urge Omnipotence, with vengeance dread,
 To pour down curses on his guilty head.
 In holy church, of universal fame,
 We constantly attend with loud acclaim.
 May ye who preach, and ye who hear the word,
 Your sacred raptures join with sweet accord;
 Improve your talents with assiduous care,
 Aspire to heaven, and reap your interest there.

15th Enigma, by Mr. T. R. SMART.

Companion Bards, without a bribe
Permit a little space,
While I in humble strain describe
Myself, and all my num'rous tribe,
The myriads of my race.

I am attach'd to ev'ry thing
Upon this earthly ball ;
To man, from beggar up to king,
What sages write, what poets sing,
The palace and the stall.

To ev'ry page, to ev'ry book,
Or medium, bad, or good ;
To rule and compass, line and hook,
Majestic river, humble brook,
To metal, stone, and wood.

Each day, and each successive night,
My use alike will own ;
The orient orb so heav'nly bright,
Sound's rapid pace, and swifter light,
Must bow beneath my throne.

When hostile rulers thirst for blood,
And nations rush to war,
Oft an impostor stands for good,
While I, in truth not understood,
Am bound in secret far.

Fugacious Time, though link'd to me,
Will search out hidden things ;
The stupid feel, the blind can see,
And I, once unconfin'd and free,
Can stay the wrath of kings.

No more I ply the needless task,
No more of me be told ;
With ease remove the flimsy mask,
Yet, if for further aid you ask,
Believe when you behold !

16th Enigma, by Miss WINIFRED WAVERTON.

My musical note is oft heard in the morn,
And formerly such was my fame,
The priesthood of old I did richly adorn,
And fair ladies are call'd by my name.

I am no son of Adam, no daughter of Eve,
 Yet my parentage trace from the earth ;
 By man much improv'd, as you'll clearly perceive,
 And with candour acknowledge my worth.

Ye fair ! though I never can boast of your sense,
 Snarling critics will often compare
 Your chatter to mine—what a heinous offence !
 How very ill-natur'd they are.

Ye lovers of harmony, listen to me,
 Since music is now all the rage ;
 I can caper and sing with as merry a glee
 As any adept on the stage.

All degrees, from the dustman to George on the throne,
 Call forth daily my beautiful voice ;
 To the friends of the muses I'm perfectly known,
 And with them I can mourn or rejoice.

17th Enigma, by Mr. NOAH WILMOT.

Pity the sorrows of a child of woe,
 A burthen'd slave, an outcast from the free ;
 For rich and poor, the lofty and the low,
 All make a practice of oppressing me.
 Wherever age or frailty appears,
 They call me in, fell ruin to avert ;
 And well and truly through declining years
 I act an honest and an upright part.
 But all my services are not confin'd
 To falling bodies—I assist to rear
 The stately pile for majesty design'd,
 The humble cot, or mansion for the peer.
 Indeed, so early am I in demand,
 That long before the first foundation's laid
 I lend the architect a helping hand—
 In his proposals all my power's display'd.
 In ancient days, as sacred records shew,
 The holy prophets were my constant care ;
 And every prophecy, in reading through,
 Will clearly indicate my station there.
 But let us not to earthy weakness trust,
 As all our boastings often end in nought ;
 For though I dwelt for ages with the just,
 I have in impropriety been caught.

The fair proportions of the works of art,
Depriv'd of me would into ruin fall;
E'en prosperity itself would lose a part,
And leave the residue equivocal.
If not yet found, I'll give you one hint more,
Which must, I'm certain, crown the least endeavour—
You'll see me clearly from yon pebbly shore
Propelling steamers up and down the river.

18th Enigma, by Mr. THOMAS WHICKER.

Come forth, my hero, and declare
Thy matchless deeds at dreadful Waterloo,
Where Wellington and British heroes fought,
And thousands fell. Attend, my hero speaks :—
The strife began, the brazen tubes were charg'd,
And waited my approach: I came—I fir'd—
And the welkin shook with thunder;
And I my hapless thousands slew.
Deprived of part, I still shall rise sublime—
Israel's glory, and heathen nations' terror.
My parts resum'd—behold yon conflagration,
The inmates driven in the cold to shiver,
Houseless, wretched, and oft without a friend:
At scenes like these the heart recoils who pause
To give relief; but there are some, ah, me!
Who never feel, and will the mite withhold:
But I can them annoy, as well as those,
And the like misery bring on all.
Enough of woe.—I'm now a stripling fine,
Attend my lady, dance at the ball, fight,
“Dash away,” cheat, bully, and act the knave;
A Newmarket Don, a court Paul Pry, pimp
For my lord, his grace, and fortune hunters;
A gull for ev'ry booby, and a go-between.
Lounge in a lobby, cross read the news,
And talk of politics, write sonnets, odes,
Or charm fair Myra's ear with strains of love;
Or with my Duchess play a sober rubber:
Such am I in my bright sun day.
But when I'm stripp'd of lands and cash, I fall,
“Like Lucifer, to rise no more.”
Some say I've little brains, and yet aspire
To wit, and oft have dar'd to wisdom, dar'd
To boast of valour.
'Tis true, I dare approach the throne, and then

I add a lustre to my honor'd sov'reign,
 And all the dazzling circles round, of peers,
 Of statesmen, and of heroes bold, who glad
 The royal presence, and their homage pay.
 My deeds and narrative I end; and claim,
 Associates, a portion of your praise.
 Let me in your pages shine, as you perceive
 In other places I am wont to do.

19th Enigma, by Mr. JOHN YEWDALE.

Ye sages skill'd in mystic lore,
 Who hidden wonders can explore
 With nicest penetration,
 Make seeming contradictions plain,
 For once admit a humble swain,
 To make a short relation.

When great Jehovah, Lord of all,
 From chaos form'd this earthly ball,
 And gave it animation;
 When man and beast, and fish and fowl,
 Were made, I liv'd not 'mongst the whole,
 Though he had wrought creation.

Indeed, 'tis mostly understood,
 That in the world before the flood
 I never had existence;
 Yet now I live, and may be seen,
 Cropping the verdure of the green
 Each day for my subsistence.

And yet, what seems a mystery,
 I'm of an ancient ancestry,
 Coeval with creation;
 But though my ancestry appears,
 T'have run for near six thousand years,
 I end the generation.

I was esteem'd in olden times,
 And even now in foreign climes
 I'm held in veneration;
 And he who travels mountains high
 Discovering wonders, keeps me nigh,
 To aid his preservation.

But, ah ! in England how abus'd,
In slavish works I'm daily us'd,
And shamefully neglected ;
Though ag'd and sickly I may be,
No offspring comes to succour me—
By fate I'm unprotected.

Like Vulcan, Juno's ugly son,
Whom Jupiter from heav'n threw down,
As if unworthy either ;
So I'm denied my parents' name,
Likewise their symmetrical frame,
In shape resembling neither.

Unchastity ! thou wicked elf,
'Twas thou produc'd my cursed self,
A warning to all others :
Then, oh (lest children curse your lust)
Be temp'rate, sober, chaste, and just,
Ye fathers and ye mothers.

20th, or PRIZE ENIGMA, by Mr. J. HOPE.

Descend, Urania ! now my mind inspire,
And thrill through ev'ry nerve poetic fire ;
Give to my subject all the charms of art
Which elegance and smoothest lines impart,
That fam'd Associates may with pleasure rise,
And greet my hero in this slight disguise.

When first Omnipotence, with sov'reign sway,
" Flung from the sun direct the flaming day,"
I then appear'd,—and, wond'rous to disclose,
Assembled seraphs hymn'd their loud applause ;
The azure vault immense, in order spread,
Before their eyes a radiant brightness shed,
Whilst vast, unknown " infinitude" ador'd,
And " stood confin'd" by heav'n's Almighty Lord !

Thus hail'd with joy, a steady friend to man,
With vast importance big, my race began ;
Admiring ages all their skill combin'd,
To find in me what ruling Jove design'd ;
To trace the sweet effects of heav'nly love,
Or awful signs of vengeance from above :
But vain their arts—their talents misapplied—
I them and all their schemes alike deride ;
To deepest counsils disappointment bring—
Involve a nation, or defend a king.

In days of yore, when ancient sages reign'd,
 One of my sisters highest rank attain'd ;
 Enthron'd she sat, in kingly pride array'd,
 And all the rest with pow'r despotic sway'd :
 But future times with one consent arose
 And in her place a lawful ruler chose ;
 Who now o'er all the potent sceptre wields,
 Dispenses blessings, and from danger shields:
 True to his post,—reverberated joys
 Smile in my face whilst he his art employs.

But to the point :—O Entertainers, know,
 I'm own'd the brightest object seen below ;
 I'm found alone, though oft'ner I regard
 A chosen troop which forms my body-guard ;
 Though always moving, oft I seem to stand,
 Regardless of my master's high command.
 In martial ornaments I'm found array'd,
 As if I'd once the warrior's weapon sway'd ;
 The youthful maid, with all her graces fair,
 Prefers the bauble I am seen to wear ;
 On me the mountain streams tremendous roar,
 And dire tornadoes sweep from shore to shore ;
 The howling monster awes the peaceful train,
 And dreadful prodigies infest the main ;
 Yet sweet Elysian fields are seen to bloom,
 And glow with tints which mock the artists' loom.
 Renown'd Associates ! should you try in vain
 My name to mention, or perplex'd refrain ;
 Should you seem wearied with the artless rhymes,
 Look equal spaces o'er in equal times,—
 This may relieve you—this may me disclose,
 And show that I'm impell'd by stated laws.

NEW CHARADES.

1st Charade, by Mr. J. BAINES.

Foaming down the narrow vale
 From the craggy mountains' sides,
 Till my second can prevail,
 How my first triumphant rides :
 Now my second often leads
 Through your cities, into fields,
 And my whole my first impedes,
 Till its bolst'rous fury yields.

2d Charade, by Mr. H. CLAY.

In my first many contracts are made,
And they are binding reckon'd :
When Pius was made Pope of Rome
He then was but my second.

My whole great rev'rence pays my first,—
He thinks that it will save him ;
And's fit to wish that being curst
Who don't do as he'd have him.

3d Charade, by C. N.

The hardy tars oft wish my first to shun,
When in distress they fire a signal gun ;
My second, ladies, is to you well known
When peace and comfort are for ever flown :
My whole is of essential use to all
Who do inhabit this terrestrial ball.

4th Charade, by Mr. T. CROSSLEY.

When my first takes a flight in the air, you will find
That my next is not left a great distance behind ;
Now join them together, and soon you will view
That the whole is as firm and as tight as a screw.

5th Charade, by Mr. J. HOPE.

My first the equestrian trav'ller attends,
And quickens his horse as he posts on the way ;
Its useful assistance the surgeon befriends,
When tumours arise, or our members decay.

My next, I am sure, is of hundreds possess'd,
And some will affirm it is found on the sea ;
Its fashion full many a dandy has bless'd,
As tailors and barbers in London agree.

My whole is a snug and a quiet abode,
Where lives an Associate I highly esteem,
Already the new ENTERTAINER has show'd
His verses, which bright with expressiveness beam.

6th Charade, by Mr. J. HUTCHINSON.

My first was waiting in the street,
 And Master Jackey wish'd to ride ;
 But as his tasks were not complete,
 Papa the privilege denied ;

On which our hero took my next,
 Disliking all such harsh control ;
 And in revenge, chagrin'd and vex'd,
 Threw down his books upon my whole.

7th Charade, by Mr. P. KING.

High in the wide expanse of space
 Revolves the glorious source of light ;
 Attending worlds vast orbits trace,
 And round him wheel in mystic flight.

My first and second from that source
 Derive their beauty and their birth ;
 Whilst swiftly runs her annual course,
 And on her axle spins the earth.

Behold my first, an infant born,
 My beauteous whole you then will view ;
 But quickly of its beauties shorn,
 It dies—yet lives again anew.

When shades of death, as scriptures say,
 Encompass and oppress mankind,
 My whole will drive them far away,
 And raise and cheer the drooping mind.

8th Charade, by Miss E. A. RICHARDSON.

My first is often seen with admiration,
 My second is a part of your support ;
 My whole was plac'd within a sacred station,
 Where but a favor'd few dar'd to resort.

9th Charade, by Mr. W. WITTON, Gedney, Lincolnshire.

Sure, Sarah, thou must be my first,
 For thou hast many charms ;
 But do not exercise my next,
 To win me to thine arms.

But, ah, in vain this artless prayer !
My whole in thy sweet face is :
My eyes, enchanted, gaze upon
Thy dimples, smiles, and graces.

10th Charade, by Mr. W. WITTON.

Come, sing my first, my charming fair,
My list'ning ears bewitching,
For thou canst sing, my heart to cheer,
And still thy lawn keep stitching.

Sing, and I'll promise thou shalt have,
As a reward, my second ;
Yet shalt thou live to see his grave,
If rightly I have reckon'd..

Then sing my first to please my next,
And to the church he'll carry thee,
But should the priest be drunk or vex'd,
My whole can never marry thee.

NEW REBUSES.

1st Rebus, by Mr. J. BAINES.

Who is fond of gay attire,
And whose heart's supreme desire
Bias'd is by outward shew,—
The last letter chang'd, devises
What the humane breast despises,
And what worth should never know.

2d Rebus, by J. E. B.

Though small is my form my colours are fair,
And my musical notes freely float on the air ;
I fly through the meads, of green boughs make my stage,
Unless cruelty keeps me confin'd in a cage.
Behead me, and then what a change in my nature ;
Transpos'd, I become e'en a part of your feature.

3d Rebus, by Mr. T. CROSSLEY.

Brave Neptune's sons I often guide
When o'er the trackless deep they ride ;
But take away the head,
And then I quickly can reveal,
That I ere now o'er hill and dale
The jovial chase have led.

Curtail again, and then, no doubt,
 By me you'll find this rebus out,
 Which must to you be plain ;
 But if another hint you crave,
 'Transpose me, and you'll find I brave
 The stormy seas again.

4th Rebus, by Mr. J. HOPE.

The sacred name which Christians all adore,
 The man whose willing labors peace restore,
 What ev'ry one with eager speed would shun,
 What man awaits when once his race is run,
 What oft is seen to glow with brilliant fire
 What counteracts the force of good desire,
 That gloomy time when silence holds her reign,
 And what no mortal man could e'er restrain :
 Join the initials—ah ! what dreadful sound
 Shall me proclaim through all the nations round.
 Prepare to meet me, then you blest shall rise
 To heav'nly joy—a rich, immortal prize.

5th Rebus, by Mr. J. HERDSON.

To half a dreary cell connect
 Three-fifths of what the Jews reject ;
 One hundred add, and nothing more,
 And they will instantly explore
 A plant well known, and very common,
 Held in esteem by man and woman.

6th Rebus, by Mr. J. HUTCHINSON.

Adown my whole, when blackbirds sing,]
 And hail the mild returning spring,
 How pleasing 'tis to stray ;
 Unlike where city scenes abound,
 In which, beheaded, I am found,
 A dark and narrow way.

Now of my head again bereft, !
 By just reversing what is left,
 You have a dreadful cry ;
 Curtailing this, you will display
 A measure then, by which you may
 Your lace or linen buy. 2

7th Rebus, by Mr. J. HUTCHINSON.

My whole, though neither load nor pack,
Is never lik'd upon the back ;
Yet though complete I there am dreaded,
I am much more so when beheaded ;
Curtail me, and I'm harmless found,—
In fact, a very simple sound.

8th Rebus, by Mr. J. RICHARDSON.

What oft is attendant on youth,
What oft is the pleasure of age,
What often has been a deserter from truth,
What often the heart does engage ;
The initials, united, will name
A flow'r that is lasting in fame.

9th Rebus, by Mr. D. ROBERTS.

Ladies, define an offspring of the graces,
Which adds fresh beauty to your charming faces ;
Decapitate, transpose it, and you'll find
A fruit, and you may taste it if inclin'd :
Extract one half o'th'heart of this fine fruit,
You'll see the cause of many a high dispute.
All parts restor'd—cut off the leading letter,
You'll have a measure, and few measures better ;
Now make it one head less, an awful place,
Where sweetest music's heard, will shew its face ;
Drop but one letter, and transpose, 'tis true
The whole of Britain will appear in view.

NEW ANAGRAMS.

1st Anagram, by Mr. J. BAINES.

Proceeding from the ocean's roar,
I boldly seize the rocky shore—
I'm fam'd for domineering :
By transposition you may find,
To shelter from the piercing wind,
A garment worth your wearing.

2d Anagram, by Mr. H. CLAY.

Reverse a trick, and you will view
A famous queen,—dear Gents. adieu.

3d Anagram, by Mr. T. CROSSLEY.

I am a fowl (in my first state),
And when in pretty good condition,
By hundreds I am thought a treat :
Now let me suffer transposition,
Then I am deck'd with fruits and flowers ;
But if you would again transpose,
My hated name upon you lowers
When you're beset with deadly foes.
Strike off the head, and may I ne'er
With you, Enigmatists, appear.

4th Anagram, by ENIGMATICUS.

My whole's a question relative to place—
Behead, if you the answer true would trace ;
Behead again, by talismanic lore,
And have again what you have had before.

5th Anagram, by Mr. J. HOPE.

How sweet on my meadows the verdure appears
When Phœbus in glory illumines the west,
And music delightful the wanderer cheers,
And soothes ev'ry care in his bosom to rest.
But form me anew—I'm deriv'd from the ore,
By labour produc'd from the bowels of earth,
Where hundreds of mortals their lot may deplore,
As almost entomb'd from the time of their birth.

Renew me once more—I again and again
Have cross'd the wide main from Columbia's strand ;
I'm also a town in the British domain,
And near to the ocean my fortresses stand.

6th Anagram, by Mr. J. HERDSON.

What you must be to merit fame,
A give this anagram a name,
Which, if deprived of its head,
Becomes a powerful thing indeed ;
Curtail again, then it will be
Past, present, and futurity ;
By transposition, now with ease
It turns whichever way you please.

7th Anagram, by Mr. M. PAXTON.

What in your hand has oft a place,
 Transpos'd, is sometimes on your face;
 Behead, and then transpose again,
 You'll have what oft disturbs the brain.

8th Anagram, by Mr. J. RICHARDSON.

With symmetry, beauty, and skill I'm design'd,
 A friend to mechanics of various kinds;
 The ladies well know me, their praise I deserve,
 For I always am pliant, and willing to serve;
 But should you transpose me, from fame I emerge,
 And become the dread curse of a country at large.
 Decapitate now, and I then am a form
 Which long has withstood the rough blast of the storm;
 And though I'm not sought for, nor put to the chace,
 I'm always in motion and changing my place.

9th Anagram, by Mr. D. ROBERTS.

In Flora's gay train her choicest of flowers
 Are laid on my breast or strung round my bowers;
 Then change, and behold through the valleys I wander,
 Where limpid bright streams through the willows meander:
 Now change me again, and of me beware,—
 Look well to your feet,—fix your hands firm—take care!

10th Anagram, by Mr. G. STARMER.

If you an acid fruit transpose,
 You certainly will find
 That it another will disclose,
 Though of a different kind.

QUERIES AND PHILOSOPHICAL QUESTIONS.
1st.—By Mr. J. BAINES.

What are the most infallible proofs of a high state of civilization in a country?

2d.—By the same.

Are any animals, besides man, possessed of the faculty of dreaming?

3d.—By Mr. J. BAINES.

Whereabouts did Julius Cæsar cross the Thames?

4th.—By the same.

What reasons can be assigned why human bones have never been found fossilized?

5th.—By ENIGMATICUS.

In the boilers of some of the high pressure steam engines water has been heated to nearly 300° Fahrenheit; and what appears very extraordinary is, that the workmen have no fear in coming in contact with the steam thus heated, as it occasions no unpleasant sensations, although at 212°, the usual temperature of steam, it would scald dreadfully. Of this curious fact no satisfactory explanation has been given.

6th.—By Mr. J. HOPE.

Which is the oldest English title—who first conferred it—and on whom was it conferred?

7th.—By the same.

Is the use of *steam*, in the various mechanical purposes to which it is applied, a real benefit to the population at large?

8th.—By Mr. P. KING.

For what purpose was wine, mingled with myrrh, offered to Christ, and what was the origin of the practice?

9th.—By C. N.

There were, and I believe there are at this time in Dolcoath Mine, in Cornwall (1000 feet or more below the surface of the earth), two springs, only a few feet asunder, one hot and the other cold. Query, the cause?

10th.—By Mr. D. ROBARTS.

Required the most approved and proved method of judging of the weather, by the barometer or otherwise? Perhaps some ingenious correspondents may be able to give the result of their own observations.

THE ENIGMATICAL ENTERTAINER.

LAST YEAR'S ENIGMAS.

1. Usher	6. Brush	11. Idol	16. Bell
2. Rent	7. Pit	12. Blade	17. Prop
3. Lantern	8. Trunk	13. Beauty	18. Spark
4. Hand	9. Hoop	14. Psalms	19. Mule
5. Image	10. March	15. End	20. Planet (<i>Prize</i>).

ANSWERS TO THE PRIZE ENIGMA.

1. *By Mr. J. BATY, Rowelton, near Brampton, Cumberland.*

The starry host and shining *planets* move,
In beauteous order, through the space above;
And as they traverse their appointed way,
To wond'ring man Almighty pow'r display.

2. *By Mr. HENRY CLAY, Moulton, Lincolnshire.*

Though I a thousand woes and pangs endure
In passing through this chequer'd vale of life;
Feel wounds inflicted that admit no cure,
And dwell 'mid scenes of turbulence and strife;
Though green-eyed Envy point th' evenom'd spear,
Whene'er a transient happiness I find;
And though my brow be "furrow'd o'er by Care,"
And gloomy thoughts sit brooding on my mind;
Yet I may hope—on Him I may rely,
Without whose will a sparrow cannot fall;
He hears my sighs, regards th' imploring eye,
And in His mercy kindly blesses all.
May I not hope (the bible says I may)
T' enjoy a state of bliss beyond the tomb?
Then flee, ye gloomy thoughts, flee far away,—
I think withapture on the world to come!

3. *By Mrs. S. CLAY.*

In a neat little cottage, secluded from sorrow,
 Where murmurs and hatred ne'er enter, I dwell;
 My bosom, mistrustless, cares not what the morrow
 May bring forth, content if the present be well.
 To me ev'ry season produces fresh pleasure,
 And joy in my bosom spontaneously springs;
 In the beauties of nature I still find a treasure,—
 A treasure surpassing the riches of kings.

4. *By W. E.*

Time and tide wait for no man:

Seize time by the forelock, the moralist said,
 Because he is bald at the back of his head;
 And, urging his flight on the wings of the wind,
 No mortal is able to catch him behind.
 Then let us pursue this advice of the sage,
 And blossom in spring, ere the winter of age,
 Congealing the promise of youth with its breath,
 The ardors of genius extinguish in death.
 The wise and the gentle, that flourish'd of old,
 Whose fame in the records of glory is told,
 Their seed of intelligence planted betime,
 And gather'd its fruit in the noon of their prime.
 Like them we would bravely aspire to excel,
 The shades that obscure the horizon dispel;
 With the star of the morning impatiently rise,
 And work while the sun holds his lamp in the skies.
 Thus early, the Saxon king, Alfred of yore,
 Would fain by activity add to his store
 Of wisdom and goodness, of vigour and health,
 Religion and freedom, the purest of wealth.
 So Bacon and Newton, the pride of our isle,
 Their way on this *planet* resolv'd to beguile;
 Devoting to science the flow'r of their days,
 In search of the treasure its lustre displays;
 And never allow'd their inquiries to cease,
 Till they rank'd with the blest in the mansions of peace.

5. *By Mr. W. FINLAY, Longhoughton.*

To name the prize, dear sir, I cannot,
 Unless it is a *star* or *planet*.

6. *By Mr. R. MIDDLEMIST, Blyth.*

Now the glorious queen of night
 Chases midnight gloom away;

While each little wand'ring light
Joyful owns her gentle sway.

Gems unnumber'd pave the sky ;
Planets ceaseless roll between ;
Twinkling stars in lustre vie,
Adding beauty to the scene.

How immense the prospect lies !
Lord, how great Thyself must be !
As it ravishes our eyes,
May it raise our thoughts to Thee !

7. *By Miss BETSEY ROBERTS, Stonehouse.*

In boundless space the *planets* roll,
Nor vary from their destin'd course ;
Under omnipotent control,
Impell'd by an almighty force.

8. *Written on the Last Day of the Year : by P. N.*

Another year is past, is flown,
Swift as an arrow in its flight ;
Gone, on Time's rapid bourn borne down,—
Lost in eternity of night.
How did I, in its infant hours,
(When lambkins sported on the plain),
Picture to-morrow strew'd with flow'rs,
With *pleasure* fraught, no trace of pain.

Time speeds away, away, away,—
Nought can arrest it in its flight ;
Night creeps on each succeeding day,
And day on each succeeding night.
Our bark with ev'ry wind that blows,
Is toss'd on Fortune's faithless sea ;
Nor e'er does mortal find repose,
'Till haven'd in eternity.

9. *By Mr. JOHN YEWDALL, Hunslet, near Leeds.*

Your prize, Mr. Hope, had puzzled the pope,
If he'd been permitted to scan it ;
Although 'tis quite clear Old-England last year
Was rul'd by a catholic *planet*.

It was likewise answered by Messrs. Baines, Gill, Herdson, Holt, King, Kniveton, Oakes, Paxton, and Whicker.

GENERAL ANSWERS TO THE ENIGMAS.

1. *Anacreon's Mistresses: from the Greek. By Mr. J. BAINES, Thornhill Grammar School, near Wakefield.*

Utraque formosa est; operosæ cultibus ambæ
Artibus, in dubio est, hæc sit, an illa, prior.

Ovid.

If with skill profound you know	7
How to count the leaves of trees,	
And, by numbering, can shew	6
All the sands that skirt the seas;	ra, 3
Then 'tis only you can tell	
What my captive heart approves,—	5
How the softer passions swell,—	rk, 18
What the number of my loves.	ade, 12
Five and thirty am'rous girls	15
Corinth, famous town, contains;	p, 9
Crowds of animated pearls	
Lightly trip the Grecian plains.	et, pr.
Greece, of all the lands on earth,	2
Famous is for maids divine,	
In whose features, from their birth,	1
Grace and symmetry combine.	
Lesbos, and th' Ionian coast,	11
Rhodes, and all the Carian line,	4
Nymphs of peerless beauty boast,—	14, 13
There two thousand loves are mine.	
Should you with precision name	p, 17
Syrian and Canopian fair,—	
Crete has many a lovely dame,—	
These my fond affections share:	
These, with ouranific joy,	unk, 8
Captive lead my willing soul;	e, 19
These, to ramble with and toy,	l, 16
As my loves you may enrol.	
And, to count what does remain,	
In the list you may comprise	ch, 10
Loves of Bactria and of Spain,	
Indian loves, with azure eyes.	

2. *Addressed to Mr. H. Clay: by Mr. C. GILL, Seamer, near Scarborough.*

Let laureate poets seek the golden bays,
And sing, in flowing numbers, empty lays;
To kings and emp'rors make their slavish court,
(Of honest men and wise the scorn and sport);

Let venal bards the flatt'ring tale rehearse,	16
And praise the great in false delusive verse ;	
Nor patronage, nor praise, nor gold I ask,—	17, 11
To sing of friendship's chains be mine the task.	15
No ideal excellence my fancy warms,	
I speak the truth, and venerate her charms.	18, 10
Truth gilds my tale ; and, though my feeble lay	nk, 8
May fail the debt of gratitude to pay,	13
With kind indulgence you will view my strain,	
And read what harsher critics would disdain.	
Five autumns now have held their fruitful reign,	
Since first you wrote to me in flattering strain ;	
In abstruse science my rude efforts prais'd,	A, 6
And emulation in my bosom rais'd.	19
Long had I toil'd, unaided had I strove	
The depths of mathematic lore to prove ;	
Yet none upon the self-taught youth had cast	
The least approving glance ; my assays pass'd	14
Scarce heeded by the editorial eye,	
Which drew from the poor tyro many a sigh.	
I write not now to question their decree,—	
Perchance 'twas justice ;—they at least were free,	
By editorial right, to spurn the trash ;	
Nor do I venture to assert them rash,	2
Since oft I read, in staring characters, the fact,—	
“ Impartial justice ever guides the act !”	5
You prais'd where lightest cause for praise appear'd,	
And gently blam'd, where ignorance had sneer'd ;	
You planted in my breast a nobler aim,	pr.
And gave me confidence of future fame ;	
Nor ever have you swerv'd from friendship's part,—	
Consistent have you been in hand and heart.	4
How sweet to know one trusted heart will feel	1
Deep sorrow in your woe, true pleasure in your weal.	7
Adieu, my friend ! be blessings on your head ;	
May heaven its kindest influence o'er you shed ;	
Guard you from ev'ry evil here below,	
From blasting sickness, and from want and woe !	
As age increases, may your honours grow,	
And learning wreaths her laurels round your brow ;	3
And when th' inevitable hour draws nigh,	
When Nature her great debt demands—to die,	
Be your's the bliss, to join the happy throng	
That round the Saviour stand, and hymn th' eternal song !	

3. *Ignis fatuus* : by Mr. JOHN HENDERSON, *Edinburgh.*

See Willy, with his wispy brand,	
Or dazzling <i>lantern</i> in his hand,	3, 4
Brush quickly o'er the boggy land,	6
Past yonder <i>pit</i> ;	7
While dupes are by his magic wand	
Allur'd to it.	
His <i>trunk</i> is all ignited air,	8
His <i>image</i> like a <i>sparkling star</i> ,	5, 18, pr.
To lure the simple from afar	19
Into his clutches ;	
While, lo ! he gambols here and there,	
Propt on his crutches.	17
Some hold him <i>ruler</i> of the bogs,	1
And only seen in hazy fogs,	
Presiding o'er the croaking frogs	
And birds of prey :	
But he is like those demagogues	
Who lead astray.	
Sometimes, in his nocturnal round,	
He visits lonesome burying ground,	
But never yet was Willy found	16
To raise the dead ;	
But comes, perhaps, to guard the mound	
From men we dread.	
What treasure he may have in quest,—	
Some <i>beauteous</i> nymph or sprightly guest,—	13
Has not yet been by lips express'd ;	
And nought but steel	
Can this nocturnal wight arrest,	
Or stop his wheel.	9
But now the <i>march</i> of intellect	10
Has <i>rent</i> away his dire aspect	2
From every superstitious sect	
Of bigots warm ;	
And put an <i>end</i> , in this respect,	15
To all alarm.	

4. *On a Son who died July 16th, 1827, aged four years* : by Mr. C. HOLT, *Jubilee School, Halliwell, near Bolton, Lancashire.*

What pen can e'er the feeling heart pourtray,
 When robb'd of what all pow'r can ne'er repay ;
 While glimmers flattering hope, the thought how light,
 But that extinct, oppressive how the weight,

I've learned.—A debt I owed to nature's hand, 15
 And thou, dear boy, the charge, the great demand.
 Just enter'd on the stage to act thy part,
 Just look'd abroad, and wonder'd where thou wert; 1
 So strange a view, what objects to be seen,—
 The sun, the changeful moon, and twinkling train :—
 Thy toys collected, things of moment great,
 Were oft review'd, and laid in proper state;
 Thy *brush*, thy pencil, and thy boring awl, 6
 Thy *trunk*, thy marbles, and thy bouncing ball; 8
 Thy *hoop*, thy hammer, and thy box of store, 9
 Were nam'd, renam'd, and often counted o'er.
 Thou little thought'st so soon to leave thy sport,
 And with thy all, thy toys, so shortly part.
 The measles fell thy little frame assail'd,
 Thy strength did shortly to th' assailant yield.
 Thy blooming cheeks of playful smiles disarm'd, 12
 Thy prattling voice to constant wailing turn'd;
 With look that feeling rous'd, thou seem'dst to crave
 For help to keep thee from the gaping grave;
 Thou seem'dst to think that we could ease thy pain,
 Could lull to sleep, or make thee sport again.
 Thy form an awful aspect soon put on,
 And *beauty* flattering all was well within : 13
 That thou so well th' assailant hadst defied,
 The watchful eye soon told a conscious pride;
 Yet wily Death but with thy vitals play'd,—
 The assailant fierce a re-attack soon made;
 Thy dying a vigour did assume,
 Thy earnest eyes confess'd thy coming doom;
 Around they glanced—they sunk to glance no more;
 So was thy journey and thy troubles o'er.
 Thy toys, so dearly lov'd, now useless lie,
 A dreary waste presenting to the eye,
 That causes restless mem'ry's busy train
 To shew what's been, but ne'er must be again.
 No more the flowers thou'lt, searching, choose,
 Nor more the butterfly thou'lt laughing rouse;
 No more thou'lt run a book or pen to fetch,
 Then list and look the grateful smile to catch.
 No *rent*, no *pit*, no *spark*, no *bell* thou'lt heed; 2, 7, 16, 16
 No *lamp*, no *hand*, no *staff*, no *mule* thou'lt need; 3, 4, 17, 19
 No *idol*, *image*, *planet*, thou wilt fear; 11, 5, 20
 No bugle in the *march*, nor *psalm* thou'lt hear. 10, 14
 Thy little brother seeks thy form to see;
 He digs and digs where last he play'd with thee.

Sweet flowers he lays along thy late trod way ;
 His toys he brings, to coax thee more to play :
 Thy name he often calls, but calls in vain ;
 He wonders why thou wilt not play again.
 He calls, he listens, starts, and seems afraid ;
 He calls, and weeps because no answer's made.
 He used to call, thy voice with joy he heard ;
 Thy laugh he echoed, and thy smile he shared ;
 Now, though he ceaseless calls, no more he'll hear
 That voice ; that smile no more he'll share.

Thou'rt gone ! thou'rt gone to everlasting rest ;
 Then why complain, since thou art ever bless'd ?
 Yes, why lament, since thou hast left behind
 A train of ills that haunt the human kind ?
 Where rumour's flying tongues are aim'd at all ;
 Where jealousy's mad sallies sting the soul ;
 Where honesty must grovel in the mire,
 And villainy to splendour can aspire ;
 Where boastful pride itself a seat assumes,
 And scorns humility, though deck'd in plumes ;
 Where fortune's favours smile but on a few :
 Where disappointment proves a constant foe ;
 Where praises fly on faithless flattery's wings,
 And merit from the envious curses brings ;
 Where wealth uplifts the proud above their place,
 That treat the poor as of a lower race.
 Then, to complain, 'tis vanity confess'd ;
 So reason says—affection cannot rest ;
 But waits with ardour at past deeds to catch,
 And memory's slaves are always on the watch.

5. *Night* : by Mr. JOHN HOPE, *Hethersgill*.

" Dicetur meritâ nox quoque nœniâ."

Hor.

Night, with *pitchy*, raven wings, 7

Brooding o'er us from above,

Rest to wearied nature brings, 2

Kind effect of heav'nly love:

Give me, then, this time of peace,

When the bustling tumults cease. *de*, 12

Night profound, the cheering day

Steals from our admiring sight,

Whilst it leaves no *sparkling* ray, 18

Beaming from the orb of light;

But, succeeding in their turn,

Stars and *planets* softly burn. (*Pr.*)

Night obscures the crimson'd rose, Loads the lillied <i>bells</i> with dew, Dims each <i>image</i> fair which glows, Fresh and beauteous to the view : Yet these seeming ills are gone When we hail the bright'ning dawn.	16 5
Night's a charming time indeed, By the <i>rush</i> or <i>lantern's</i> blaze <i>Psalms</i> and <i>prophecies</i> to read, And with heart and <i>hand</i> to praise HIM who <i>ushers</i> in the morn, Earth with <i>beauty</i> to adorn.	6, 3 14, 17 4 1 13
Night the learned sage befriends, Helps astronomers to prove When each radiant orb ascends, Sets, or culminates above : How harmoniously they roll, "Though in solemn silence all."	
Night the poet's tuneful odes Tempt in lofty strains to rise, Far above these dark abodes Thoughtless mortals <i>idolize</i> , Where angelic <i>troops</i> are shown <i>Marching</i> in the heav'nly zone.	11 9 10
Night's an emblem of the tomb— "Tis a silent, solemn time ; But amidst its deepest gloom Virtue swells with hope sublime, <i>Musing</i> on that <i>blest</i> retreat, Where the good have bliss complete.	19
Night at last her course shall <i>end</i> "Round this dark terrestrial ball ;" Judgment shall from heav'n descend, And our God "reign all in all :" Then a glorious day shall rise, Ever beaming through the skies.	15 8

6. *Address to a Canary after the Season of Moulting :*
by Mr. J. E. LONG, Vauxhall.

Sing, little bird, and so repay
Thy fondling nurse's care ;
Her kind attention through each day
In grateful mem'ry bear.

When of thy *rich and beauteous* dress
 Thy tender *form* was robb'd,
 Her eye beheld thee with distress,
 Her anxious bosom throbb'd.

But now, in gay attire array'd,
 Renew thy cheerful *strain* ;
 And thus restore the lovely maid
 To tranquil peace again.

Fear not Grimalkin's greedy jaws,
 Protected by that *friend*
 Who ever will defend thy cause,
 And prompt *assistance* lend.

Then *playful* on her shoulder sit,
 From ev'ry ill secure,
 With her who never can forget
 Thy safety to ensure.

Think of the num'rous feather'd train,
 How few their comforts prove,
 Who seek for shelter, but in vain,
 Compell'd at large to rove.

With their's compare thy happy state,
 And thou canst ne'er refuse,
 Or for a moment hesitate
 Thy mistress to amuse.

Could'st thou invite them to thy cot
 Methinks they all would come,
 Transported at the pleasing thought
 Of such a happy home.

7. *Address to Associates:* by Mr. T. R. SMART, Loughborough,
 Leicestershire.

Once more the year its annual course has run,
 And chill October shows a fainter sun ;
 What time we from the russet field retire,
 To seek the comforts of the cheering fire :
 In social converse evening hours engage,
 Or pleasing study o'er ASSOCIATE's page ;
 Rous'd at the name, the Muse reprunes *her* wings,
 And to her much lov'd friends the rustic sings. 1

If praise or merit to the verse be due,
 LESTER, that merit, praise, belong to you :
 In all the wand'rings of my comet race,
 Through various countries, kingdoms, climate, place,

In ev'ry scene, my friend was not forgot ;
 Return'd, I sought your hospitable cot ;
 And whilst in sportive chat we spent the night,
 The Muse our theme, you urg'd me on to write ;
 Pleas'd, I at once complied, nor could withstand
 The generous wishes from a friendly *hand* ; 4
 Accept this tribute from a mind sincere,
 Which holds thy virtues and thy talents dear,
 Nor let thy modesty obtrusive deem
 This public notice of my warm esteem.
 In infancy, charm'd with Diaria's page,
 The love of verse my earliest thoughts engage ;
 Form'd simple *images* while yet a child, 5
 HUTTON receiv'd the artless lay and smil'd ;
 Bid me *march* on ; and gave in print a nook, 10
 'Midst mighty masters, in the valued book ;
 Where WOOLSTON, RICHARDSON, and TRUSWELL shone,
 JONES, STAFFORD, LEE, with lustre all their own ;
 Nor was the lofty verse confin'd to males,
 Sweet sung NARCISSA, and yet sweeter SMALES ;
 With other *belles*, the *idols* of their times, 16, 11
 Sparkle for ever in immortal rhymes ; 18
 But death or age have quench'd the sacred fires ;
 Mute are their voices, and unstrung their lyres. 19
 Of those who wanton'd on Diaria's plains
 In her proud day, but RICHARDSON remains.
 As when the Sun has clos'd his day's career,
 Darkness approaches, and the *stars* appear : *planet (Pr.)*
 So, when these suns of science *sunk* to rest, 8
 My paly star just *twinkled* in the east ; *lantern,* 3
 Diarian *beauties* fann'd the flickering flame, 13
 And gave the poet and the song to fame ;
 Fix'd I remain, attach'd to both the ages,
 A link which joins the juniors and the sages.
 Charm'd with the prospect which ASSOCIATE shows,
 With renovated joy my bosom glows ;
 With anxious hope its merits may excel, 12
 Which only can be done by writing well.
 I, though for *poetry* not overfit, 7
 Will boldly dare to lay down rules for wit ;
 Like whetstones, which though dull and heavy feel,
 Can polish rust, and give an edge to steel.
 Not all, Associates, who presume to sit
 Critics of taste and arbiters of wit,
 Can, to be censors, claim a just pretence,
 Or rightly judge 'twixt ignorance and sense :
 'Tis this which loads with trash the *blushing* stage, 6
 And damns the credit of a vicious age :

From this depravity, shall we pretend 15
 To scorn all rule, yet hope to find a friend?
 No: with more caution bid the Muse proceed,
 And think each man a critic that shall read;
 Thus, though the bard advent'rous gain no praise, 9
 He 'scapes the censure due to careless lays.
 Let proper judgment guide your choice of words,
 The fittest terms your native tongue affords;
 Haply you please when current words appear, 2
 To glide with bow! like smoothness to the ear:
 If, when your general answers you rehearse,
 Some crabbed phrase destroys the sweets of verse,
 Vulgar or rude, avoid the low disgrace,
 And let the margin be its proper place;
 Or have recourse to other lawful art,
 And let italics show each separate part.
 In equal measure let the verses shiae,—
 With nicest care avoid th' unequal line;
 No pains too great this error to avoid,
 The pleasure vanish'd, harmony destroy'd:
 Howe'er with art conceiv'd, the verse we blame,
 With strictest justice, if the feet be lame.
 Yet every feeble expletive forbear,
 The generous nerve remains no longer there;
 A wretched tameness fastens on the song, *psalm, 14*
 And, like the dormouse, sleeps and crawls along.
 When a fit subject strikes with vivid force,
 Rush not too hasty on with rapid course;
 Matura with pains and studious thought each part,
 And cast the outline with a happy art;
 The whole complete with elegance and ease,
 And, dress'd with judgment, shall be sure to please.
 By arts like these ASSOCIATE's name shall stand
 A tow'ring dome in an admiring land;
 A stately temple, elegant and chaste,
 Sacred to Science, Poesy, and Taste;
 Its well chose subjects, cloth'd in stateliest rhymes,
 Reach other countries, live in other climes;
 Tow'r proudly o'er the rest, the first in fame,
 And unborn ages hail ASSOCIATE's name;
 Order pervade the whole, complete each part,
 Such, much lov'd bards, at least, the wish of SMART.

8. *Addressed to the Editor: by Miss WINIFRED WAVERTON.*

When I the ENTERTAINER had
 And saw a prize for Winny,
 Believe me, Sir, I felt as glad
 As if I'd found a guinea.

Not for the value of the thing,
But merely for the honour;
And Winifred again shall sing,
Since Fortune smiles upon her.

The poor old maid is pleas'd enough 9
To find you have not miss'd her;
And she will send you lots of stuff, 11
If Muses but assist her. 1

Ye lovely belles her verse inspire, 16
Sweet daughters of Apollo,
Till Entertainers all admire
The charming strains which follow.

A spark may soon become a flame, 18
A colony, a nation;
And Winifred the heights of fame
May reach by emulation.

Your puzzles, gentle Sir, this year,
Mysterious are and witty;
The prize I cannot guess, I fear,
Though all must own 'tis pretty. 13

Friend Hope his annual march pursues, 10
With cheerful songs delighting; 14
Then follow him each humble muse, 19
Nor wait for more inviting.

While Robarts, Wilmot, Smart, and Clay, 12
Their richest treasures blending; 8
United talent shall display,
ASSOCIATE'S cause befriending. 15

Supported by transcendent worth, 17, 2
Inspir'd by their example, 7
Ye feeble poets venture forth,
The field is large and ample.

Since Editor approves your song,
And merit ne'er despises,
Each year like planets brush along, 20, 6
In hope to gain the prizes,

Yes, heart and hand let all engage 4
With him in firm alliance;
Our wisdom shall improve the age 5
In this abode of science.

9. *The Banks of Aire* : by Mr. JOHN YEWDALE.

While some are bewailing their lot, Believing they're born to despair, Contented I live in a cot That stands on the banks of the Aire.	7
With Metcalf and Bell I can join, Whose converse I frequently share; To march, when the morning is fine; Adown the sweet banks of the Aire.	11, 16 1 10
We behold the bare <i>trunks</i> of the trees, And <i>brush</i> o'er the lawn debonair; Such <i>beautiful</i> rambles as these, We take on the banks of the Aire.	8 6 13
When bus'ness does sometimes command, In dark winter nights I am there; My <i>lantern</i> I take in my <i>hand</i> , And walk on the banks of the Aire.	3, 4
You'll find I've a plain <i>humble</i> home, A wife, and four <i>images</i> dear; If ever you happen to roam Near Leeds and the banks of the Aire.	19 5 17
If blest with a <i>spark</i> of good health, Though <i>planets</i> should frown, I don't care; I live without titles or wealth, Resign'd, on the banks of the Aire.	18 <i>prise</i> 9

10. *Reflections written on an Excursion to the Heights of Maker, near Devonport* : by Miss BETSEY ROBERTS.

The summer, so charming, all nature is warming, And moorlands and highlands are clothed in green; Save the rocks of the mountain, or stream of the fountain, A more charming prospect can never be seen. Again see the <i>billow</i> extend its blue pillow, How gentle and easy its falling and rising; Once turbulent ocean, how steady thy motion, As if to repose on thy surface advising. Again see the woods, and the <i>bright gushing</i> floods, The first, how they tow'r so lofty and proud; The latter so humble, its <i>waters</i> does tumble, Now <i>sparkling</i> and silent, though sometimes so loud. On yonder high crag behold the black shag Has placed her nest in a <i>pit</i> 'mongst the rocks, Where man cannot reach it, yon high point protects it, And the <i>march</i> of intruders effectually blocks.	k, 8 r, 1 17 15, 16 2 lm, 14 4, 6 11 12 18 7 13 10
--	--

On the face of the tide in grandeur doth ride
 The boast of Britannia, her pillars of oak; 9
 Whose tremendous thunder has caused the wonder
 Of nations far distant expos'd to its stroke.
 High mounted I stand, and look o'er the land, 19
 The rest of my forefathers, where I had birth;
 And still I admire, and still I desire
 Thy beauties, O Cornwall, beyond all the earth.
 The lantern of night is spreading its light, 3
 The planets will soon in their glory appear; 20
 And I must retire, with high fraught desire, 5
 To assemble with you at the close of the year.

Answers were also received from Messrs. Baty, Enigmaticus, Finlay, Harrison, Middlemist, C. N., Paxton, J. Richardson, and Whicker.

ANSWERS TO THE CHARADES.

- | | | |
|--------------|--------------|---------------|
| 1. Floodgate | 5. Rowelton | 8. Shewbread |
| 2. Churchman | 6. Carpet | 9. Witchcraft |
| 3. Deathbed | 7. Dayspring | 10. Layman. |
| 4. Dovetail | | |

1. *To the County of Lancashire: by Mr. JOHN BAINES.*

Pugnacious county! pray, thy morals mend; pet, 6
 Thou lay'st behind our other English shires;
 A vile, unseemly proneness to contend
 Degrades thy race; the worst of passions fires. light, 7
 Surely thy sons are form'd of different mould,
 A different blood runs in their frenzied veins gate, 1
 Than that which we in southern climes behold, man, 2
 In Belvoir's valley, or on Ebor's plains. kfast, 3
 And if their ancestors were Flemmings vile, ton, 5
 Or mongrel Irish of the worst degree, bread, 8
 'Tis plain thy humid air and mountain soil 10
 Does not ameliorate the progeny.
 Pray, then, amend; to peace be reconcil'd,
 Like other mountaineers in other climes;
 The Scotch, and Swiss, and Welch of manners mild, t, 9
 Distinguish'd more for virtues than for crimes. l, 4

2. On *Mr. John Waters, of Kaysheuseburn, formerly Parish Clerk of Stapleton Church* : by *Mr. JOHN BATT.*

Near <i>Rowelton</i> , beside the public road,	5
A parish clerk had fix'd his shug abode ;	
At <i>church</i> the worthy <i>man</i> was duly seen,	2
With dress respectable, and pious mien ;	
Mild as a <i>dove</i> , a <i>tailor</i> by his trade,	4
No fears of <i>witchcraft</i> did his peace invade.	9
He as a <i>layman</i> prov'd a steady friend	10
In <i>deathbed</i> scenes, where oft he did attend.	3
By industry to <i>shew</i> he earn'd his <i>bread</i> ,	8
At <i>dayspring</i> to his work he ever sped ;	7
He own'd a humble cot devoid of state,	
Fearless, though <i>floods</i> at times approach'd his <i>gate</i> :	1
While he beheld aloft the heavenly bow,	
And Nature's verdant carpet spread below.	

The Charades were also answered by Enigmaticus, Mess. Herdson, Holt, C. N., Paxton, and J. Richardson.

ANSWERS TO THE REBUSES:

- | | | |
|--------------------------|--|---------------------------------|
| 1. Fop, foe | | 6. Valley, alley, yell, ell |
| 2. Finch, chin | | 7. Thump, rump, rum |
| 3. Chart, hart, art, tar | | 8. Lily, rose, or iris |
| 4. Judgment | | 9. Smile, lime, lie, ile, isle. |
| 5. Tobacco | | |
-

1. By *C. N., of Creeg Barkley Burrow, Kenwyn, Cornwall.*

I like the <i>rosy</i> , smiling lass	8, 9
Who with <i>tobacco</i> , pipe, and glass,	5
Will entertain a friend ;	
Whose <i>judgment's</i> clear, and vision too,	3, 4
Not <i>thump</i> and scold as some will do,—	7, 6
I'd such to <i>China</i> send.	2

2. *Ode to Happiness* : by *Mr. JOHN RICHARDSON, Etal, near Berwick, Northumberland.*

Oh, Happiness ! thou shadow, why so fickle,
 So void of substance and so great in fame ;
 Thy name is as a novel, and the tale

Is false which sage or poet tells of thee.
When mortals would indulge the flattering hope
That thou art near, and mean'st on them to *smile*, 9
Deceiv'd, deluded are their artless minds,—
Thou fleest, and art not.

These have I sought each day, each night, each week ;
And each returning year have hoped to find thee ;
But, like the *chaffinch* chirping o'er the *valley*, 2, 6
Thou mock'st my ev'ry vain attempt to grasp thee,
And all my searches end in disappointment.
'Tis thou that *bafflest* learn'd philosophers ; *cco*, 5
By them the blissful *chart* has ne'er been laid 3
To guide the sailor on this sea of trouble
Into thy peaceful haven.

Say, fleeting meteor, wert thou e'er possess'd
By *fop* or lordling, emperor or king ? 1
'Tis said thou once wert known in Eden's garden,
But sin dispell'd thee thence, and since that hour
Misery and thee alike to thorns and *roses* 8
Have linked close companions.

Since thou amidst the transitory scenes
Of fleeting life art never to be found,
May all fam'd Associates follow virtue,
And evil shun. Then, when the day of *judgment*, 4
By heav'nly truth unerring, seals each doom
As they deserve, they'll meet a just reward,
And live for ever in thy bless'd abodes. *x*, 7

The Rebuses were answered by Messrs. Baines, Enigmaticus, Harrison, Herdson, Holt, Kniveton, Middlemiss, Oakes, and Paxton.

ANSWERS TO THE ANAGRAMS.

- | | |
|----------------------------------|------------------------------|
| 1. Surf, furs | 6. Clever, lever, ever, vere |
| 2. Bam, mab | 7. Ring, grin, gin |
| 3. Gander, garden, danger, anger | 8. Thread, dearth, earth |
| 4. Where? here, ere | 9. Garden, gander, danger |
| 5. Dale, lead, deal | 10. Lemon, melon. |

1. *Lines written on the Walls of Bredon Tower, Worcestershire :
by Mr. JOHN BAINES.*

From Yorkshire's flow'ry hills I came *n*, 10
To light and trim the mental flame ; 3
But here the friend of science mourns, 1
And man the path to knowledge scorns, 5

Content in <i>ignorance</i> to stay,	7
To eat and drink, and <i>live</i> his day ;	6
Unmindful of <i>that</i> better part,	8
That nobler pursuit of the heart,	
Which, spite of all the rakish clan,	4
Is that which dignifies the man.	r, 9

2. By Mr. W. HARRISON, *Ogle Barony, Northumberland.*

Mild Spring approaches, let us roam the <i>dale</i> ,	5
Where Blyth's lone stream is dashing <i>swif</i> around ;	4, 1
There <i>ever</i> taste the healthy murmuring gale,	6
And penetrate the woody depth profound :	
There, free from <i>danger</i> , as mild eve steals on,	3, 9, 10
And 'compass'd round with many a pleasing lay,	
Reflection paints to hours that now are gone,	
And seasons that too quickly fled away.	
The <i>earth's</i> sweet renovation smiles around,	8
And brings, in Fancy's eye, upon our view	
The schoolboy haunts, ere from our native ground	7
With boyant hopes we trod the glist'ning dew.	
But, ah ! these youthful dreams too oft allure,	2
Too oft we find them end in grief and pain ;	
Oh, childhood ! in thy reign our joys how pure :	
We pleasures feel we ne'er can know again,	

3. *A Fairy Tale : by Mr. JOHN HERBSON.*

Queen <i>Mab</i> within her fairy ring	2, 7
Can at her beck vast numbers bring,	
As ancient legends tell ;	
And as her elves do thus advance,	
She <i>leads</i> them in the mazy dance,	5
As if by magic spell.	
"The dancing past, the board is laid,	
"And surely such a feast is made	
"As heart and lip desire :	
"Withouten hands the dishes fly,	
"The glasses with a wish <i>come</i> nigh,	10
"And with a wish retire."	
And thus they spend the night in glee,	
From <i>every earthly danger</i> free,	6, 8, 9, 2
Whereall is sweet delight ;	4
But when the cock begins to crow,	
The spell is broke, and off they go,	
And vanish out of sight.	

4. *To Honesty: by Mr. CHARLES HOLT.*

Ah, Honesty! thou bashful guest,
 Why dost thou not in ev'ry breast
 Thy golden sceptre wave?
 Why dost thou not attend thy post,
 To guard, with care, thy feeble host,
 And from destruction save?

Thy frame is weak, or thou'rt afraid;
 For when a contest's with thee made,
 Thou'rt forced to depart:
 A *melon*, nod, an idle wink,
 Nay, e'en a thought can make thee shrink,
 So fickle oft thou art.

10

Where'er thy rude but *clever* foe,
 Dishonesty, to drive thee low,
 His wily schemes invent,
 Though vig'rously thou triest to stand,
 He rears his head, his crowd at hand,
 Then thou'rt a packing sent.

4, 6

The mandates of the potent will,
 When that commands thou must fulfil—
 Denial must not be:
 If thou wert favour'd like thy foe,
 As much in company to go,
 Less *danger* we should see.

9

Our twisting quibblers at the bar
 Would nothing have about to jar
 And earn their daily *bread*:
 The *gander* on the grassy plain,
 And bark upon the swelling main,
 From theft would nothing dread.

3

To-morrow's promise scarce would fail,
 Nor misers want a double bail,
 Their pelf t'ensure:
 The juggler with his spell and charm,
 And wheedling quack would seldom harm,
 Nor *bam* and rob the poor.

2

The gamester, with his cards and dice,
 And store of craft, would not rejoice
 To rob a flatter'd friend;
 But pleasing gratitude would reign,
 And truth would *lead* her candid train,
 Nor falsehood with them blend.

5

The golden age we should possess,
 And dearth would seldom shew his face ; 8
 Deceit would be unknown ;
 ! For light would beam from ev'ry eye,
 And nope would ape solemnity,
 To mount a golden throne.

5. *An Address to his Walking-stick, used in consequence of
 having sprained his Foot: by C. N.*

Hail, trusty companion ! through mire and dung,
 Who oft at the horse and the dog hast been flung ;
 Who'st been my lone comrade o'er hill and o'er dale, 10, 5
 When I've call'd at the Rock* for a tankard of ale :
 And when in much danger I've hobbled along, 9
 O'er hedges and ditches, and bushes among ;
 Through woodlands and forests, 'midst brambles and trees, 2
 Whilst searching for tin-shoad, and crude manganese.
 At church and at chapel thou'st been with me too,
 And supported me back without any ado ;
 Ne'er did'st thou refuse thy assistance at all, 1
 But always wast ready at every call. 6
 And after all this, my threadbare old friend, 8
 I hope that ere long thy service will end ; 4
 And then for thy aid and support heretofore
 I'll lay thee safe by, as do misers their store.

*Answers were also received from Messrs. Baty, Enigmaticus,
 Gill, Paxton, and J. Richardson.*

ANSWERS TO THE CHARADES, REBUSES,
 AND ANAGRAMS.

The Village Curate : by Mr. JOHN HOPE.

On yonder landscape see a rising ground,
 A humble cottage, and a garden fair, A 3, 9
 Where bloom the rose and lily sweet around, A 4, R 8
 And shed their fragrance on the ambient air.

There, far sequester'd from the walks of fame,
 The Village Curate, poor in fortune, dwells ;
 But here my Muse conceals his humble name,
 Since modest merit outward show repels.

* Sign of the *Roach Rock*, in Cornwall, a Public-house kept by
 Mr. John Robins.

Suffice it to say—far as on sabbath days,
 When rings the joyful peal's melodious tone, A 7, 10
 The churchman travels Sion's God to praise, C 2
 His garb and features are familiar grown.

Though on his brow no teasing honours shine,
 In academic groves or halls attain'd,
 The Bible spreads for him a chart divine, R 3
 By which the narrow path of life is gain'd.

See in the pulpit ev'ry nerve he strains
 To stem the floodgates which our wakeful foe, C 1, R 1
 With witching craft and never-ceasing pains, C 9
 Keeps open wide, the christian to o'erthrow.

Hear him repeating—"Judgment dire impends R 4
 O'er faithless fops and laymen, prone to ill: R 1, C 10
 "The dayspring from on high shall soon descend, C 7
 And ev'ry threat'ning in its time fulfil!"

At deathbed scenes his presence you behold, C 3
 Where dark behind the fatal sisters stand,
 As tuneful poets feign'd and sung of old,
 The thread to snap with unrelenting hand. A 8

Here speaking truth, the bread of life he shows, C 8
 And leads the way to Him whose precious blood A 5
 Makes crimson guilt as white as mountain snow,
 On which no foot of man or beast has stood.

Along the stream's meand'ring banks he strays,
 When summer's sweets perfume the ev'ning gale,
 To hear the blackbird's ever plaintive lays, A 6
 Or cooing dove, when soft her notes prevail. C 4

And shall I say, that, leaving books inspir'd,
 Romantic tales his leisure hours beguile;
 That Homer's page his breast has often fir'd,
 And even fairy Mab has gain'd his smile? A 2, R 9

And what is worse—a sigh of discontent
 At times intrudes on joys he prizes dear,
 When he recounts the pittance fortune sent,
 The pittance small—his "forty pounds a year."

When he beholds to rank and honour brought
 The favour'd few the fickle goddess owns;
 Whilst poor neglected worth in vain has sought,
 In various instances, to shun her frowns. R 2

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O, bard of *Rowelton*, hear the Muse's song— C 5
 Hear, *Wilmot*, *Robarts*, both accounted wise, R 5
 Such are the failings found his deeds among, A 1
 And here set forth, divested of disguise.

But oh! remember, few with perfect mind,
 As "burning lights" illumine this vale below; R 7
 Then let our hearts, with fellow feeling kind, R 6
 And "servent charity," for ever glow.

They were also answered by Messrs. Whicker and Yemdall.

GENERAL ANSWERS TO THE ENIGMAS, CHA- RADES, REBUSES, AND ANAGRAMS,

*As To the Contributors and Editor: by Mr. DAVID ROBERTS,
 Stonehouse, Devon.*

Success to your labours, ye high favour'd few,
 Who still do the paths of bright science pursue; E 1
 Whose friendly *assistance* enables the youth E 2
 To rend the false cov'ring enveloping truth; E 3
 And clear as the light from a *lantern* to show E 4
 Its beauties at *hand*, wishing all men to know.
 Ev'ry building of taste from geometry flows;
 By her it was nurtur'd, and by her it rose :
 The *image*, the cornice, the pillar, the mould, E 5
 Her axioms discover, her rules do unfold:
 Upon the proportions and properties rare
 Of the straight line and curve, of the angle and square,
 The *brush*, and the cockpit, the *trunk*, *hoop* and arch, E 6, 7, 8, 9
 Must ever be formed by intellect's *march*. E 10
 Fam'd Euclid (no *idol*), might *worm* out a *point*, E 11, 12, 13
 As plain as a carpenter e'er form'd a joint;
 And plain as *psalm* singing; the *end* to define, E 14, 15
 How the point set in motion would trace out the line;
 Hence in forming a *bell*, on a curve you alight, E 16
 And a *prop* is the strongest when fixed upright; E 17
 Thus a *spark* of smart genius a *rule* can define, E 18, 19
 To show that a *planet* moves in a curve line. *Prize*

In lore philosophic you can clearly display
 How the *flood* by the *church* to the *cove* winds its way;

[C 1, 2, 3]

How the *dove* does near *Rowelton* build its frail nest ; C 4, 5
 How the meadows in *carpets* of verdure are drest ; C 6
 How the *spring* yields its water, and corn becomes *bread* ; C 7, 8
 What folly is *witchcraft*, the poor *layman's* dread, C 9, 10
 Might serve just to frighten a weak country *lass*, R 1
 But with people of genius it never can pass :
 Not an *inch* on a *chart* but your *judgment* can scan, R 2, 3, 4
 With its currents and eddies, and where they began ;
 Show the spot where the planter *tobacco* will sell, R 5
 And where the rude savage does whoop his war-*yell* ; R 6
 Very far from the *hum* of the city or town, R 7
 Where the *rose* or the lily but seldom is grown ; R 8
 Not like this fair *isle*, where merit is hated, R 9
 And turncoats and sycophants highly are rated.

But hold ! should our worthy friend Atkin but see
 What I write, it might make us again disagree ;
 Which I wish to avoid, as I honour the bard
 (And so does friend Wilmot) with honest regard ;
 But wonder why he his companions forsook,
 As his name has not once yet appear'd in this book ;
 Where every true heart would most cheerfully greet him
 As brother and friend, and would cordially meet him.
 "Avast !" you will say ; "you've not finish'd your task :
 "There's the Anagrams yet."—O, your pardon I ask :
 Then if through the *surf*, with queen *Mab* I must ride, A 1, 2
 If *danger* there is, I will swim with the tide ; A 3, 4
 In fashion to keep with the year twenty-nine,
 When the great *deal* out favours refused lang syne ; A 5
 And *alter* their tune in a right *clever* way, A 7, 6
 To answer the humour and *thread* of the day : A 8
 That their *gardens* of *melons*, may prosper right well, A 9, 10
 And dead men, you know, no secrets can tell.
 So now, Mr. Ed. I have finish'd my rhyme :
 Methinks you now echo, "We think it is time."
 If worthy, why then send it out in the world ;
 If not, to the flames be it instantly hurl'd.

2. *A Glance at 1828: by NOAH WILMOT, S——s, near
 Newcastle on Tyne.*

Clos'd is thy course along the stream of time,
 Like that of all thy transitory race ;
 And to oblivion's dim and misty clime
 Thou now art gliding with a steady pace.
 No smiling omens *usher'd* in thy birth, E 1
 No lucky *planet* guided thy career ; E 20
 To mark the "*march* of intellect" on earth— E 10
 We saw but one good deed of thine appear.

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But it was *one** that *thump'd* intol'rance down, R 7
 And *rent* the fabric bigotry had rear'd; E 2
 Leaving its parts a very harmless ruin,
 Which *loop'd* and *dovetail'd* hitherto appear'd. E 9, C 4

Thus *clever* men this *idol* brush'd away, A 6, E 11, C 6
 This *image* faint of faggots, fire, and blocks, E 5
 Which *tortur'd* once such as refus'd to say m, E 12
 Their prayers with those consider'd orthodox.

The *dayspring* this, and dawn of brighter days, C 7
 When private *judgment* shall the *charter* be R 4, 3
 For modes of worship, and for offering praise
 To the Almighty with sincerity.

The reign of mental tyranny is past,
 Like that of *witchcraft*, never to return; C 9
 Now *fops* can feast, and pious men can fast, R 1
 Or *shenbread* eat, yet not each other spurn. C 8

Had all thy days been spent in sim'lar deeds,
 How dim the *lily's beauty* then to thine, R 8, E 13
 In history's *garden*, where the rankest weeds R 9, 4
 To choke the tender flower too oft combine.

But *vice's floodgates* now were open thrown, C 1
 The darken'd *lanterns* and the murd'rous blades; E 3
 Deeds perpetrated utterly unknown
 In *Romelton's* secluded, peaceful shades. C 5

When on the *surface* of her flow'ry *dales*, A 1, 5
 The *gander* feeds, and wanders where he wills; A 3
 The *finches* warble forth their tender tales, R 2
 The *mule*, too, grazes on her verdant hills. E 19

And though her sons have not their *bamboo* chairs, A 2
 Their Turkey *carpets*, or their *lemonades*; C 6, A 10
 They live content, and whiff away their cares
 With their *tobacco*, as they con charades. R 5

No ruffian *CORDER*, deaf to *pity's* cry, E 7
 Alike unmov'd by youth and beauty's *smile*; R 9
 Is here *propell'd* to crimes of deepest die,— E 17
 Seduction, murder, treachery, and guile.

But this array of wickedness appears
 To sink in shade, with all its horrid glare,
 Beside the crimes, unknown in former years,
 Of those atrocious monsters, BURKE and HARE!

* The Repeal of the Test and Corporation Act.

Through them thy few remaining days became
 To shame, disgrace, and misery a prey ;
 They stamp'd a bloody stigma on thy name,
 That Lethe's stream can only wash away.

When thy frail *trunk* was on a *death-bed* laid, E 8, C 3
 And life's last *thread* was drawing to an *end*, A 8; E 15
 There was no *churchman* to lend thee his aid, C 2
 Nor *layman's hand* to close thy eyes as friend. C 10, E 4

Thy vital *spark* no sooner took its flight E 18
 To death's dark *valley*, than thy exit drew R 6
 Forth songs, not *psalms*, of pleasure and delight, E 14
 Whilst merry *bells* were *ringing* thy adieu. E 16, A 7

Thus set thy sun upon this busy stage,
 Amidst a scene of most appalling crime ;
 And left to horrify each future age,
 A crimson stain upon the page of time.

Answers were likewise received from Mr. Ord.

ANSWERS TO THE QUERIES.

1st Query, answered by Mr. J. BAINES.

In savage life, force is the predominating principle. Little regard is paid to justice, or the sufferings of others; the strong command, and the weak are necessitated to obey. No provisions are made by the affluent for the aged, the infirm, or the unfortunate; all sink indiscriminately beneath the pressure of evils when they can no longer bear up against them. Qualities opposite to these, therefore, must be proofs of civilization. That community is the most civilized which makes the best provision for the helpless, relieves the indigent, instructs the ignorant, trains up the rising generation in the path of duty, virtue, and religion; and treats the tender sex with the greatest kindness. Indeed nothing is a greater proof of barbarous manners than the ill-usage of the weaker part of our own species. Among the most prominent indications of civilization of the present age in this country, may be mentioned the establishment of Sunday and national schools, mechanics' institutes, friendly societies, savings banks, hospitals, and infirmaries.

Again, by Mr. WILLIAM HARRISON.

A complete scene of cultivation, an intimate acquaintance with the arts and sciences, a quiet submission to laws and government, and a high sense of fidelity, honesty, and humanity, are probably as great proofs of a high state of civilization as can be adduced.

This Query was also answered by Messrs. Baty, Holt, Hope, A. Middlemiss, Paxton, Robarts, Sheridan, and Smart.

2d Query, answered by Mr. J. BAINES.

It is not well ascertained what faculties, even in man, are suspended during sleep. The operations of the mind sometimes suffer but little interruption, as is evident from the phenomenon of dreaming; the judgment likewise may be perfectly sound at the same time, which is sufficiently manifest from the intricacy of the solution to a mathematical question, previously unknown, having been unravelled in a dream. In the human species, the operations of dreaming are frequently indicated to a by-stander by certain sounds of the voice, and movements of the limbs. This observation, if extended to irrational creatures, will plausibly decide the point. A horse has been heard to neigh, and a dog to bark, when asleep. These animals, then, at least, are endued with the faculty of dreaming; but we have no proof that it extends to every other animal in the scale of creation.

. All our Correspondents who have answered this Query are of similar opinions, admitting, that other animals besides man possess the faculty of dreaming.

Answers were also received from Messrs. Baty, Harrison, Herdson, Hogan, Holt, Hope, A. Middlemiss, Paxton, Robarts, Sheridan, and Smart.

3d Query, answered by Mr. J. HERDSON.

It is generally supposed that Julius Cæsar crossed the Thames at *Coway Stakes*, seven or eight miles above Kingston. This place is so called from the *stakes* which the Britons set up on the adverse shore against Cæsar, where he passed over the Thames in the Ford at Coway (i. e.) a passage for cows.—*Bailey's Dict.*

Again, by Mr. ANDREW MIDDLEMISS.

Cæsar, when speaking of this river, says, "Quod flumen uno omnino loco pedibus; atque hor sægre, transire potest." It has been therefore, generally supposed that he crossed it at Coway

Stakes, seven or eight miles above Kingston ; but Horseley and others, seem to be of opinion that he forded it near that town.

* * Such is the opinion of our Contributors generally.

Messrs. Baines, Carr, Hope, Paxton, and Roberts, also sent answers to this Query.

4th Query, answered by Mr. J. BAINES.

That the materials which form the mountains, valleys, and plains of the present world were once in a state of inadhesion, is sufficiently evinced by numerous remains of animal and vegetable substances found imbedded in them, in a multitude of situations far from the regions in which the animals are found to live ; and where, from the nature of the climate, they never could have existed in the living state. There are too many mountains intervening between the countries which they might have inhabited and those in which they are found to admit of any other means of conveyance than by a general deluge. It is not probable that any catastrophe of this kind has taken place on our planet since the days of Noah, B. C. 2348 ; but it is by no means certain that other similar inundations did not precede it. If the fossilized bones so frequently met with belong to antediluvian animals cotemporary with the race of Adam, human fossilized bones would either have been found, or they will not fossilize ; but as the bones of all land animals afford by analysis nearly the same substances, there seems to be no ground for the latter supposition. It may be said that fossilized remains of the human species would, if sought for, be found in the countries adjacent to Mount Ararat ; but it is much more probable that that flood which could remove the carcase of an elephant from the torrid zone to Siberia would have brought, at least, a few human bodies from the banks of the Tigris to some part of Europe. The most plausible inference is, that fossilized bones have been imbedded in the earth at a general deluge prior to that of Noah, and belonging to a period of animal existence in which man was not an inhabitant of this planet.

Again, by Mr. D. ROBERTS.

Ancient writers have given various accounts and descriptions of *anthropolithi*, most of which the genius of after ages have proved to be without foundation ; and it was, until very lately, generally supposed, that human bones were not to be found in a fossil state. Yet lately a fossil human skeleton has been discovered in the island of Gaudaloupe, and imported into this country by Sir Alexander Cochrane. It is imbedded in a block of calcareous stone, composed of particles of limestone and coral, and which, like the aggregation of shells found on the limestone coasts of some parts

of this country, has acquired a great degree of hardness. It is, therefore, an instance of a fossil human skeleton in a state of petrification, in an alluvial formation.—For a particular account see *Appendix to Cuvier's Theory of the Earth*, by Professor Jamieson, page 248-253.

This Query was also answered by Messrs. Baty, Hogan, Hope, Middlemiss, Parton, and Roberts.

5th Query.

To this Query we have not received any satisfactory answer. That it is a fact what Enigmaticus has therein stated, others as well as ourselves, who have examined the immense high pressure engines used on many of the mines in Cornwall, will be able to testify; having witnessed that the hand may be harmlessly applied to the steam close to any fissure from which it escapes, but if the hand be withdrawn to a little distance from the opening it will be scalded, as is usual from the common steam of boiling water.

6th Query, answered by Mr. J. BAINES.

The title of earl is of very remote origin, having been in common use as an official dignity among our Saxon ancestors, though it is not the oldest English title, that of king, queen, or prince, being much more ancient. Boadicea, queen of the Iceni, poisoned herself in A.D. 61; and Caractacus, a British prince, was carried in chains to Rome, A.D. 51. However, the most ancient British king we have any certain account of, is Mandubratius, of the Trinobantes (people of Middlesex, and the adjacent country), whose title was conferred and enforced by Cæsar, B.C. 54 (Commen. v, 20).

Again, by Mr. J. HOPE.

It appears from our English historians, that the title of *earl* is the oldest English title. It was in use amongst the Saxons; but it was first conferred with authority over particular districts by William the Conqueror, shortly after he obtained the English crown, he allotting to each of them the third penny arising from the pleas in their several jurisdictions. It also appears, from Bede and others, that the Latin *comes*, Saxon *alderman*, and Dano-Saxon *earl*, were the same. Amongst those on whom *earl* was first conferred by the Conqueror, we may perhaps reckon Hugh Earl of Chester; Cospatric, Earl of Northumberland; Roger, Earl of Hereford; Ralph de Guader, Earl of Norfolk, &c. *Baron* was introduced soon after the conquest, succeeding to the Saxon title *thane*. We find that the word was often used for the

whole body of the nobility collectively; for regularly all noblemen were *barons*, though they had also a higher dignity.

It was also answered by Messrs. Herdson, Paxton, Robarts, and Smart.

7th Query, answered by Mr. W. HARRISON.

If the benefits derived from the application of steam were distributed among the labouring classes, its use would then be beneficial; but as long as these benefits are monopolized by individuals, its application will obviously be hurtful to the population at large.

Again, by Mr. C. HOLT.

Every labourer is desirous of doing his work in as little time and with as much ease as he can, and is anxious to adopt such means as will assist him in doing so, and such means he considers a benefit: the spade superseded the labour of the hand alone; the plough drawn by horses superseded the spade; much more work may be done with it in the same time, and with much more ease than with the spade. The hand-mill superseded the knocking or rubbing of grain to flour; the mill forced by horses superseded the hand-mills; water-mills and wind-mills, superseded horse-mills, &c. Now, if these be considered benefits to mankind, I infer that, as a plough or a hand-mill is to the benefit of one man or of one class of men, so is the assistance of steam with improved machinery to the benefit of mankind at large. But to this general rule many exceptions might be adduced. If steam were allowed to benefit mankind as it might, it would doubtless be a very great advantage. Much more might be said both for and against; too much for the limits of this work.

Again, by Mr. D. ROBERTS.

Certainly the use of steam is of great service to the population at large (whatever a few in the manufacturing districts may say to the contrary), in cutting short a great deal of labour, which may be very usefully directed to other matters. Through the power and use of steam in facilitating our manufactories in divers ways, we are enabled to meet, and carry the preponderance over our neighbours of the continent, who otherwise, by the cheapness of provisions, and consequently the low rate of labour among them, would be enabled to undersell us in foreign markets, and thereby block up our trade. But for the steam engine there are none of the large mines, either of ores or coals, which could by any means be wrought to advantage.

Again, by Mr. T. R. SMART.

However it may be argued, that in the present unnatural state of our commercial relations, the use of steam is necessary to enable us to meet the foreign manufacturer in the market, still, in our case, I consider it, *generally*, a very great evil. With a population almost, if not altogether, unequalled, as compared to our extent of territory, and that population rapidly increasing, it is scarcely possible to apply steam machinery to any manufacturing purpose without depriving a portion of the community of the means of support; or, at the least, narrowing them so much as to deprive them of some of the very few comforts they enjoy, by reducing their wages, which are already far too low to meet the exigencies of the times. Steam engines can only be *generally* beneficial in countries where the population is not sufficiently numerous to carry on at the same time agricultural pursuits and foreign commerce.

Answers were also received from Messrs. Baines, Baty, Herdson, Hogan, Hope, and Paxton.

8th Query, *answered by Mr. JOHN HOPE.*

As crucifixion was productive of the most acute bodily pains, it was customary to give those about to undergo this punishment some stupifying potion, in order to render them insensible of their sufferings. With this design *οινον εσμουρμωσμενον*, or as St. Matthew has it, *οξος μετας χολη μεμιγμενον*, was given to Christ. "Here," says the learned Dr. Whitby, "the Evangelists do not differ; for *חֲרִיבִי*, which signifies *wormwood*, is by the Seventy rendered *χολη*, Prov. v, 4. Lam. iii, 15. And [so *merora*, which has its name from bitterness, is rendered, Job xvi, 13, xx, 14."

Again, by Mr. MATTHEW PAXTON.

It appears to have been a custom among the Jews to present wine mingled with myrrh, or some other stupifying drink, to persons who were condemned to capital punishments, when they were about to suffer death. This kind of drink was given to intoxicate the condemned, in order to take away the sense of pain: whence in Psalm lx, verse 3, it is called the stupifying wine, or the wine of astonishment. It was, therefore, for the purpose of

rendering Jesus insensible to the terrors of death that the Jews offered him wine mingled with myrrh before he was nailed to the cross.

Messrs. Baines, Baty, Carr, Herdson, and Roberts, also answered this Query.

9th Query, answered by Mr. JOHN BAINES.

Springs are formed by rain oozing through the pores of the earth, and descending along natural channels to lower stations on the surface. There may be many channels of this kind under ground, two or more of which may happen to terminate at nearly the same place, though very different in their course and direction. If one of these should run over a bed of pyrites, the water will acquire from them sensible heat; and on this principle the phenomenon may be explained.

Again, by Mr. D. ROBERTS.

Water varies much in its qualities, according to the nature of the substances it has to pass through before it is discharged by springs or otherwise. In the present case one of those springs proceeds from a copper lode, or vein in the earth, which produces copper, and the water has to pass through immense beds of copper pyrites, which are mixed with ores of zinc, cobalt, and a variety of species of mundics, or sulphates of iron, &c. which, by chemical process, are known to produce heat: hence a great number of warm springs, of different degrees of temperature, in different parts of the world. This water is rough to the taste, and quite unfit for culinary purposes; and it often deposits a yellowish sediment. In mines it is often so strongly impregnated with copper, as to cover iron tools lying therein a few hours with a thin coat of copper. This water destroys vegetation. The other spring rises from a lode of a different description, and was higher up wrought for tin, and still continues to produce some of that ore. Now, in general, the water issuing from a tin lode is cool, soft, and pure, and fit for use; and in it vegetables thrive well. Therefore the warm spring issues from a copper lode, and the cold spring from a tin lode.

It was likewise answered by Messrs. Baty, Holt, Hope, and Paxton.

10th Query, answered by Mr. JOHN HERDSON.

Much has been said and written on the prognostication of the weather. Mr. Jones in his physiological pieces says, that when it rains during a moon, the following change will probably pro-

duce fair weather for a few days, and then a continuation of rain; but, on the contrary, when it has been fair throughout, and it rains at the change, the fair weather will probably be restored about the fourth or fifth day of the moon, and continue as before. And he adds, that he has made hay after these observations for twenty years, and has never had it once damaged by rain.

Again, by Mr. C. HOLT.

In my opinion, no general unexceptionable rule can possibly be given for judging of the future state of the weather. The barometer is, perhaps, the best instrument by which we can know the present state or weight of the atmosphere, but not the true state of the weather. I have known the mercury high in the barometer for several days together, and the weather wet during that time, and the contrary; the cause of which may be thus accounted for: the place of the barometer may be the concourse of two different currents of air or breezes coming in directions that are inclined to each other; that compress the adjacent air, and raise the atmosphere higher, and consequently cause it to be heavier there than it generally is, and which breezes may be loaded with clouds, and of course cause rain: the reverse may have a contrary effect. But as to telling the future state of the weather by it, I think it an impossibility in these changes, that are subject to frequent and sudden variation. The rules prescribed by observers of the course of the wind and age of the moon, are, according to my observations, likewise ineffectual, and not to be depended upon with any degree of certainty. The prognosticators of the weather in the various almanacs very often differ much among themselves; and their predictions respecting it may not improperly be termed impositions on the credulous. I have known many farmers much injured in the harvest time by depending too much on the barometer, as well as on the almanacs. I have heard a wise (often deceived) farmer say he would put his barometer under a flag during harvest time; another, that he wished he had burned his almanac. Perhaps the best method is acquired by continual observance and experience made by a skilful and proper talented person, and may properly be termed an art that cannot be learned by theoretical rules communicated from one to another, but is the result of continual practice, like other arts. The most experienced in this, are I think, often deceived.

Again, by Mr. M. PAXTON.

In judging of the weather by the *barometer*, people in general pay too much attention to the words *fair*, *rainy*, *stormy*, &c. engraven upon the scale; and it is a common error to imagine that, as long as the mercury, or the index which marks its course,

points to those expressions, the weather will be in accordance with them. The most important fact, however, to be ascertained in making an observation is, whether the mercury is in the act of rising or falling; as, if it ascends, although the index point to the word *rain*, it is a much surer indication of fine weather than when the index points to *fair*, and the quicksilver descends. The point may generally be ascertained by gently tapping the instrument; which, freeing the mercury from a slight adhesion to the glass, allows it freer motion, and instantly shows its upward or downward tendency. Sudden and considerable changes in either direction are commonly followed by fair or foul weather equally transient; while a steady rise from day to day of about a tenth of an inch in twenty-four hours, or a prolonged fall in the same proportion (either of them passing the mean average point for the month), may generally be trusted as prognostics of continued fair weather or rain.—*Companion to the Almanac.*

Again, by Mr. D. ROBERTS.

The rising of the mercury in the barometer presages fair weather, and the falling, foul weather. In very hot weather the falling of the mercury foretells thunder. In winter, the falling foretells, in severe frost, a thaw; and rising foretells frost. In continued frost, the rising foretells snow; at other times it generally falls in snowy weather. When the mercury rises after rain, serene weather generally follows; when it falls after rain, expect more. When fair weather follows soon after the rising of the mercury, or foul weather soon after its falling, neither will continue long. If the mercury rises or falls gradually for a few days before a change, expect a continuance of dry or wet weather accordingly. In the barometer a large tube should always be preferred; in which case you may observe the rise or fall of the mercury by the convex or concave appearance of the surface of the mercury in the tube long before it can be perceived by the index. Also a diagonal barometer is far preferable to a perpendicular one, the rise or fall of the mercury being much easier observed.

When in the morning the hills are covered with fog which passes away before the sun, it is a sure sign of fair weather. When the distant mountains and landscapes appear very clear and plain, it is a sign of fine weather; and when sound is heard for a great distance, it is the same. But when the tops of the mountains continue wrapped in clouds, and the distant landscapes appear hazy, even in fine weather rain will soon follow. The prognostications of Minna Troil, in the *Pirate*, are much to the purpose: "The morning mist lies heavy upon yonder chain of isles, nor has it permitted us since daybreak even a single glimpse

of Fitful-Head, the lofty cape that concludes yon splendid range of mountains. The fowls are winging their way to the shore, and the shell-drake seems, through the mist, so large as the scarf. See the very shear-waters and bonxis are making to the cliff for shelter. See the air is close and sultry, though the season is yet so early, and the day so calm, that not a windel straw moves on the heath. See how heavy the clouds fall every moment; and see those weather-gaws that streak the lead-coloured map with partial gleams of faded red and purple. The storm which these signs announce will be a dreadful one."—*The Pirate*, vol. i, p. 56 and 59.

NEW ENIGMAS.

1st Enigma, by Mr. J. BAINES.

Ere man was made, 'mid Eden's balmy breeze
 I buoy'd my parent 'mong embowering trees :
 In variegated or in simple vest
 My worth and beauty surely none contest ;
 Though 'tis not known, except for motion fram'd,
 Or nature's garb, why I existence claim'd.
 Before the ark towards Ararat was blown
 My use as ornament was quite unknown ;
 Nor is it prov'd by chronologic art
 That I to man did dormal ease impart ;
 But when, through commerce, luxury had birth
 In various nations of the globous earth,
 Inventive fancy, and a gainful race,
 Quickly transferr'd me from my natal place,
 And made me inmate of some snug domain,
 Pent from the light, th' abode of ease and pain.
 In other scenes, brighter than May-day morn,
 A decoration by the fair I'm worn ;
 As which, if 'tis not needless to relate,
 My introduction is of modern date ;
 And story tells, that at a neighbouring court,
 To which the fashions of the world resort,
 I did at first surprisingly enhance
 The graceful beauty of a queen of France.

2d Enigma, by Mr. C. GILL.

"Man is a social creature:" he is born
Dependent on his fellows ; each to each
Administers ; and, in the gen'ral chain
Of human nature, the desires and wants
Of our will minister to those of many ;
The misery of one may be the source
Of joy to thousands : thus the balance leans,
By providential care, to gen'ral happiness.

Pity that I, the bane of human joy
And social intercourse, should ever rise
To check its genial glow, disorganize
A system so divine, and, 'mong the haunts
Of man the seeds of endless discord sow.

I am the nightmare of the mind, that haunts
The day-dream of th' industrious citizen,
Repress the efforts of his powerful mind,
And drown his energies ; for, while he strives,
With ceaseless industry, to kill me quite,
He oft begets me in more frightful form,
And multiplies my hideous images.
Thus, like the netted partridge, flutt'ring round,
And still herself entangling the more
The more she strives to free her from the toils,
He sees his hopes of independence lost,
His children eat the bread of bitterness,
And dies, himself, my victim, in a prison !

I oft entrap the inexperience'd youth,
And "through the lane of life pursue him hard :"
Seldom his utmost efforts can effect
Escape from bonds so terrible as mine.

But oft'ner I attend the prodigal ;—
I mark, with eye experienc'd, his track
Through wanton riot, and unbounded waste ;
Behold him reckless rushing on his fate,
And glut my fancy with the certain spoil :
His "father's halls" already are my prey ;
Gaunt poverty and I press hard upon him,
Till, to elude my grasp, he oft commits
A crime, for which he forfeits his loath'd life !

Associates, let your humble bard entreat
Your candid ear :—avoid my very shadow ;
Shun, as you would th' infectious leper,
My hated form ; sure that disgrace and want
Will follow in my train.

3d Enigma, by THE HIGHLAND LASSIE.

Lovers o' Nature, ye wha joy to rove
 Through dew-besprinkled mead or leafy grove,
 Wha choose, at close of eve, the lone retreat,
 Where Contemplation holds her peacefu' seat ;
 How oft, while heedless folly dances by,
 You pause to gaze on me wi' downcast eye ;
 Where, prostrate at your feet, wi' meek appeal
 I reach the hearts that hae been taught to feel.

Nature is fair, she's a' that bards can sing ;
 Bright Summer's glow, the blush o' early Spring ;
 Her woodland melodies, her hills and dales,
 Her waving meadows, and her flow'ry vales,
 Her swelling streams, wi' ever winding mane,
 Are fair, beyond description's highest praise.

Yet not alone to Nature's power I owe
 Whate'er of int'rest may be mine to show :
 By rustic hands, wi' earnest toil and skill,
 Behold me form'd, my duty to fulfil ;
 An offering made, I clasp it to my breast ;
 One closing touch—and Nature does the rest ;
 Decks my soft bosom in her vernal hues ;
 At morn and eve imparts her gentle dews ;
 Bids her sweet warblers hover o'er my head,
 And kind affection come wi' gentle tread,
 To breathe the sacred incense of her sighs,
 On angel pinions wafted to the skies.

Such the sequester'd spot where I am found,
 And such the scenes my humble self surround :
 Dear to the musings of a soul refin'd,
 And a' the noblest feelings o' the mind.

For you, wha turn unheeding frae the theme,
 Or a' unworthy o' your notice deem,
 It argues not your wisdom to disdain
 What you in secret hope yoursels to gain.
 Nay, would resent it wi' indignant pride,
 Could you but dream my shelter were denied.

Ye feeble slaves o' superstitious fear,
 Wha tremble should my lowly form be near ;
 O, break the awfu' spell your reason charms,
 Nor cherish in your breasts these weak alarms :
 Go, practise virtue, Conscience be your guide,
 Fear God ! and banish ev'ry fear beside.

4th Enigma, by Mr. C. Holt.

With caution speak, with caution act, ye fair;
With caution judge, your censure always spare;
Can wild report with wishing e'er be tam'd?
Can lost repute with weeping be reclaim'd?
Can scandal's sounding trump be e'er at ease?
Can rumour's thousand tongues from babbling cease?
No, no,—the more you try the torrents to assuage,
More force they gather—more they often rage,
By me supported; for I lend them aid;
I bear them on, and make them wider spread.

When the Almighty his great work proclaim'd;
When man to be the lord thereof was nam'd;
Ere from the earth his stately form was hit,
I was,—for proof examine Holy Writ.
When Adam named all the earthly race,
And Satan brought on human kind disgrace;
When Abraham offer'd up his only child,
When Isaac was by Jacob's craft beguil'd;
When great Goliath Jesse's son beheld,
When Jesse's son was victor of the field;
When Dan'el in the lion's den was laid,
When Jonah in the fish's belly pray'd;
When Jesus to the stubborn cross was nail'd,
When Paul at Cæsar's judgment seat appeal'd;
I then was us'd,—to me they'd all recourse;
When well applied I've efficacious force.

When bacchanals around their bowl are set,
Hilariously displaying vanity and wit,
They me display, in hopes I praise shall gain,—
I sometimes do, and sometimes cause chagrin.
If proudly introduc'd with boastful jeer,
Perhaps they laugh or rage, they curse or swear.

The swelling peals resound, the pious few
Approach the fanè, devotion to pursue;
The organ joins, with measur'd sounds, the choir,
The pastor's rules with heav'nly views inspire;
Then I'm on duty, and I safely bear
From place to place the cause of joy or fear.
I good or bad am deem'd, or long or short,
And tend to pain or pleasure, joy or sport.
Ye gents should, like the fair, be on your guard,
Though just, I seldom meet a just reward.

5th Enigma, by Mr. JOHN HOPE.

Fairest of goddesses, sweet Flora, bring
 Before our eyes the fresh returning spring,
 Diffusing odours which thy steps attend,
 'Midst "shadowing roses on our plains descend ;"
 Inspire the theme thy blooming honors raise,
 And deck thy temples with encircling bays.

When from the world primeval darkness fled,
 And round our globe the solar beams were shed,
 With op'ning beauties grac'd, I rose to view,
 Fair as the lily, pure as mountain dew :
 No Boreal storms my youthful bloom impair'd,
 Nor rude, intruding hands my bounties shar'd ;
 With me angelic innocence was found,
 And sweet contentment all my blessings crown'd ;
 O happy days ! too soon to pass away,
 And leave my friends to countless ills a prey !

As ages roll'd, succeeding summers bore
 The sweets of Asian plains from shore to shore ;
 My bosom glow'd with renovated fire,
 And genial Phœbus gave me rich attire ;
 All ranks my company with pleasure sought,
 My charms admir'd and varied presents brought ;
 Till, swell'd with pride, I spurn'd the lowly land,
 And rose on high at royalty's command ;
 Look'd down with scorn upon the passing crowd,
 Whilst majesty itself in homage bow'd.

These days are gone ; and now I've long maintain'd
 The proper level which I first attain'd :
 My shape is various—frequently I'm found
 A comely form, rectangular or round ;
 Kind to my offspring, with a mother's care
 I patiently their ev'ry weakness bear ;
 On softest beds I rest my infant race,
 And clasp their limbs within my fond embrace,
 Till growing lovely, many a suitor bows,
 Their beauty praises, and prefers his vows ;
 But leaving me, they in confinement mourn,
 Or, torn and mangled, never more return !

O ENTERTAINERS, favor'd sons of song,
 The artless tale already seems too long ;
 One truth shall close it :—He who reigns on high,
 The Lord supreme of sea, and earth, and sky,
 By ardent love of mortal man inspir'd,
 From busy scenes of life to me retir'd :
 But O, beware ! charge not on me those deeds
 At which the feeling breast of pity bleeds.

6th Enigma, by Mr. PERCI KING.

The mystic muse had Nature's wide domain
Long since explor'd; had rifled hill and plain;
Yet still seems longing for some untried joy,
Some sweets to taste, that neither sate nor cloy.
The long research protracts, with prying care,
Lays immaterial, all material bare;
But all in vain: no subject for a theme,
Save me, is found, more worthless than a dream.
A thing well known, made by man's crafty hand
For mankind's use, a humble servant stand.
Increase your force, or magnify your power,
Amuse your days, disturb your midnight hour.
Yea, should I now before your eyes appear,
You wonder not, I've oft before been there.

Myself forthwith, proceed I to describe:—
A race distinct, apart from ev'ry tribe:
Imprimis, then, my parentage and birth—
But stop!—no place have I on this fair earth,
Nor heav'n, nor hell, can my dread self produce;
Though still say I, well known, in common use.
Immortal matter shudders at the thought,
That into being I should e'er be brought.
Her mighty sons proclaim distressing strife,
And me they murder ere I enter life.
First, fire with redd'ning rage boasts matchless power
To bring me forth, and prove my natal hour.
His flames blow fiercer, yea with tenfold rage;
Combined foes against his power engage.
Air, Earth, and Water, hasten to the fight,
Whilst Nature sickens at the woful sight.
In thunder, Air proclaims the war begun;
Affrighted clouds obscure the angry Sun:
Roars for the carnage ev'ry furious blast,
In ruin whelms whole tow'ring fabrics vast.
Astonish'd Earth, though hostile to the foe,
By fear unnerv'd, recoils at ev'ry blow;
Outrageous Ocean now foams fiercer far
Than when old Neptune tumbled from his car;
Spouts cataracts, and drenches all in brine,
Nor calms, nor stills, till aw'd by Power Divine.
Then's drown'd the red-hot foe, and all is whist,
The war is ended, and I *non exist*!
Yet still *am I, ne'er was, nor ever end*:—
Declare my name, and own me for a friend.

7th Enigma, by Mr. W. LESTER, Woodhouse School.

Loud rolls the thunder, forked lightnings fly,
 And densest clouds rush through the troubled sky ;
 The mightiest oaks fall riv'n on the ground,
 In thousand shivers strew'd, with crashing sound :
 And now descends to earth the mingled show'r,
 The torrent roars with all resistless pow'r,
 Bearing along with furious headlong force
 The noblest works, nor aught can stay its course.
 Imperious man, Creation's vaunting lord,
 Ev'n he recoils, and fears th' avenging sword ;
 Nor dares to run or stay, perhaps he falls
 A blackening curse, far from his native walls :
 Th' affrighted animals to shelter hie,
 And cowering I haste with them where they fly.

The storm is hush'd, each rising fear repress'd,
 And peaceful calm succeeds, and needful rest ;
 Reviving Nature each fond bosom warms,
 The landscape glows with renovated charms ;
 Man, bird, and beast, the late sought covert leave,
 And hail with joy their terror's glad reprieve.
 High in the air my gambols may be seen,
 Dumbly expressive on the flow'ry green,
 The tuneful tribes now carol from the spray,
 Charm'd with the change, they chaunt the pleasing lay ;
 The blackbird sings, the lark mounts high in air,
 Mark well her flutt'ring song, perhaps I'm there.
 In either element I live and move,
 On earth, in ocean, or th' expanse above ;
 Fly with the courser in the rapid race ;
 Impel the hunter to his keenest pace ;
 Say now for what—'tis all that I may bleed ;
 For this he risks his neck and gen'rous steed.
 In public life I act,—without my aid
 The fiddler might forego his tuneful trade ;
 The mighty Linley, and great Cramer's art,
 Would soon be dumb, did I not hold my part.
 Let not vain terrors strike the careful mind,
 One common lot attends all human kind ;
 Where'er I'm seen, where'er my way I bend,
 This truth is plain—I am the fated end.

8th Enigma, by Mr. R. MIDDLEMIST.

Hail, happy pair! in Eden's blissful bowers,
 Where love and duty wing'd the fleeting hours;
 But ah! transgression with its train of woes
 Too soon disturb'd that season of repose;
 Too soon the round of misery began,
 And me, 'mid other ills, bestow'd on man.
 I'm known to all their progeny; for, lo!
 I teach the tears of infancy to flow;
 Implant a pang in manhood's brightest stage,
 And form the torment of experienc'd age:
 E'en high philosophy can only bring
 A partial solace to relieve my sting.

Hark! valiant Richard, England's royal heir,
 Leads forth his hosts, to die or glory share—
 "Adieu!" he cries, "Britannia's hallow'd strand!"
 And bies him on to Palestine's fair land:
 There, fir'd by me, the youthful heroes rage
 The long usurping heathen to engage;
 In wildest zeal they place me in the van,
 And eager rush upon the Pagan clan;
 Nor did they yield till many a thousand died,
 And I, though vanquish'd, all their hope destroy'd.

E'er since, as ages glided on apace,
 I always held a high distinguish'd place;
 In almost ev'ry town I took my stand,
 Fear, rev'rence, and devotion to command;
 The people, trembling, paid the tribute due,
 And taught their offspring to respect me too.

Though oft by me the wretched victim bled,
 Convuls'd in anguish, till his spirit fled;
 Yet to mankind sweet comfort I impart,
 And thousands closely press me to their heart.
 Attend, ASSOCIATES. (I will not deceive.)
 And hear my counsel, ere I take my leave:
 Drive other trifling vanities afar,
 And choose me only as your polar star;
 Place your desires, affections, all on me,
 And you shall always safe and happy be—
 Happy through all your pilgrimage in this,
 And reign immortal in the world of bliss.

9th Enigma, by Mr. L. ORD, Gatehead Fell, Durham.

Mark how the blight spreads desolation o'er
 The plain, which cheerful green adorn'd before ;
 So that the spring the face of winter wears,
 Where all was beauty, but a wreck appears.
 For food, see ev'ry where poor pussy tries,
 With disappointment in her eager eyes ;
 She panting sits, and wonders at the change,
 And now anon resumes her fruitless range.
 I press so heavy on her panting breast,
 Her weary eyes refuse their wonted rest ;
 She strives to shun me with her fleetest speed,
 And swiftly skims along the sterile mead :
 But all in vain ; I make her yield her breath,—
 By my command she meets an early death.
 The same vicissitude of fate man shares
 Full oft, as that which overtakes the hares.
 All do admit this truth without a doubt,
 " Man has a host of remedies found out ;"
 But what avails his wisdom or his skill,
 When he feels, so much against his will ?
 When he beholds a dearth spread o'er the ground,
 And neither fruit nor herbage can be found ;
 With haggard looks I stare him in the face,
 And oft he falls a prey to my embrace.
 Thus I've laid empires waste, in all their pride,
 Than war more fatal, if I'm not belied :
 I have been felt by all our race below,
 So my destructive powers all well must know ;
 From kings and nobles in this goodly land
 To meanest subjects under their command.

10th Enigma, by Mr. J. RICHARDSON, Etal.

ASSOCIATES kind, when winter nights prevail,
 And raging Boreas blows the northern gale,
 To aid amusement in its purest spring,
 I venture here, and strike the sounding string.
 See yonder village green, where youths resort
 To spend the leisure hour in youthful sport ;
 Where reverend age is seated in the sun,
 To view his by-gone sports before him run ;
 The joyful acclamation hear them raise,
 All anxious to obtain the mead of praise ;
 Amidst such happy scenes I'm often found,
 Imparting pleasure to the crowd around.

Leave now the rural scene, and join the life
Of London city, share its bustling strife;
You'll find that I have also chang'd my place,
You on another element me trace:
There I frequent, and may be seen to glide,
My stated course on Thames's oozy tide.
By kings and nobles I am patroniz'd,
And, ladies fair, by you I'm highly priz'd;
Contentions I can quell, and peace restore,
Where nought but civil broils were known before.

Behold me now, your servant at command,
Perhaps imported from a foreign land;
I yield obsequious to my owner's will,
And humblest offices I oft fulfil,
The toiling housewife, and the youthful maid,
In times of need accept my useful aid;
Yet in this servile guise possess'd of power,
I aid the miscreant in an evil hour.
From me proceeds the cause of death, or awe,
And mischief dire its origin can draw;
Come then, ye bards of enigmatic fame,
Withdraw the slight disguise that veils my name.

11th Enigma, by Miss RICHARDSON, Vauxhall.

Companion of each social bard,
I hold myself to view;
Receive me then with kind regard,
For I belong to you.

And would you my beginning trace,
This truth you'll clearly prove;
I was before the human race,
And sprang from heaven above.

I dwelt with Adam and his wife,
Such my antiquity;
For He who call'd them into life
To each of them gave me.

From this descent I quickly ran
Through ev'ry thing on earth,
And 'twould be well did ev'ry man
Appreciate my worth,

If innocent I still remain,
I crown you with success;
But if my purity you stain,
I bring you to distress.

You have me always, what I am
Is plain enough to see;
In each perplexing anagram
You may discover me.

12th Enigma, by Mr. D. ROBARTS.

A servant of servants, himself would intrude,
Nor once fear your censures, should you think him rude;
Because he knows well, if you chide him or flout him,
You would be the sufferers should you do without him;
So lest I should fail in describing the elf,
I think 'twould be best he should speak for himself.

Kind gents, I'm your servant, dear ladies I'm your's,
And still shall be so, though I creep on all fours:
So now to oblige you, and by your permission,
I'll drop a few hints of my state and condition.

I'm bred in the fields, and am dug from the earth,
No obstetric doctor assists at my birth;
I'm torn from my parent, besmeared with blood,
Or rent from her bowels, and drench'd by a flood;
I'm drowned, I'm roasted, I'm burnt in the fire,
I'm mangled and cut by a servant for hire;
I'm flay'd by a miscreant, and put on the rack;
Besmeared with dirt, stretched out on my back;
I suffer the torture; nor ever complain;
If I did, I should find my complaints would be vain:
I still must endure the heat and the cold,
In durance, in prison, in ill's manifold;
While man, cruel man, is still my tormentor,
Of evils the source, and of crimes the inventor.

But hold! "I am roaming;" I'm not yet myself.
Though bending towards it, and purchas'd by pelf;
I must be bought over by one that is clever,
Who'll cut me and carve me, dismember and sever;
Till I to his mind bend and bow with submission,
When I pass to another of lower condition;
Who, still more severe, will mangle and cut me,
Beat, batter and maul, and afterwards gut me,
Or more cruel still, my features will mar,
And drive through my body an iron bar;
Then beat me again, "with might and with main,"
Thus mangled and cut, I'm left on the plain;
Or hung like a thief, to be look'd at by men,
Or thrown in a pool, where I loudly complain.

I'm now your companion on horseback or foot;
I'm clam'rous and noisy, although I am mute;

I've coaches and chariots attendant on me,
And horsemen and footmen of ev'ry degree ;
I attend at the races the kingdom all over,
And have won the St. Leger prize. You may discover
I'm always the first that does start for the heat,
And first at the winning post, yet I am beat ;
For though I'm in first, I am always in last,
And in future shall be so, as well as times past.

For dancing I'm famous, on tight or slack-rope,
For tumbling and leaping few with me can cope ;
I can leap a five bar when a hunting I go,
And a high quickset hedge either over or through ;
And when wily Reynard has yielded his breath,
I ride the first hunter that's in at his death.

At the flashy race-ball I in grandeur appear,
For then a rich vesture I frequently wear
Of satin or silk, with top-knots so gay,
A beautiful foot I then often display ;
And skip through the dance so clever and airy,
You might think me attendant on sylph or on fairy ;
In waltzes, cotillions, in hornpipes and reels,
I beat out the music so nice with my heels ;
So complaisant I, with true flesh and blood,
Attend on the wicked as well as the good ;
And although at times I am cleanly and neat,
I at other times mix with the dirt in the street.

13th Enigma, by Mr. D. T. SHERIDAN, Colton Hall,
Lichfield.

While tepid gales o'er rosy bosom'd May
Breathe softly sweet, to hail the new-born day ;
And sylvan songsters thrill the balmy air,
Let me my attributes to man declare.

I am whate'er you touch, behold, or taste,
In heaven above, or in the trackless waste.
The painter dwells with rapture on my form,
Corrects, compares, and feels my pow'rful charm.
Th' exemplar, from whose ever-varying stores
He draws, to eternize his plastic pow'rs.

The tuneful bard, in softly flowing lays,
My various beauties to the world displays ;
Extols my amplitude and power to please
Men of all nations, colours, and degrees.

The philosophic sage, who still pursues
Truth's radiant track with philanthropic views,

Who combats error with resistless sway,
 And drags fanatic falsehoods into day,
 O'er me in sacred sympathy deplores
 Th' Egyptian darkness that pervades our shores.

The pensive lover, whose desponding mind
 In melancholy mood avoids mankind,
 On me reflects, till frenzy fires his breast
 With loveliest images, by heaven imprest;
 Brilliant as Sirius in a cloudless sky,
 And softly soothing as sweet airs of joy;
 O'er lofty hills and woodland scenes he roves,
 To steal one longing glimpse at her he loves.
 I'm still the same, which makes the lover mourn
 Those pleasing scenes, ah! never to return.

The ladies too adorn me with delight,
 And rear me altars, morning, noon, and night;
 Bow at my shrine, and worship as they kneel,
 The loveliest prospect Nature can reveal!
 In spring, my youthful charms delight the heart;
 In summer, my beatitudes impart
 A sweet succession of alternate joys,
 Dear to the heart, and pleasing to the eyes.
 In autumn, my enchanting glories give
 Joy to the grateful hearts of all that live:
 And e'en in winter I present to view
 Sublimier scenes than Raphael ever drew.
 Ye sons of soaring science, tell my name;
 And raise your own to everlasting fame.

14th Enigma, by Mr. T. R. SMART.

Birth! what is birth? the brainless coxcomb's pride,
 And laugh'd to scorn by all the world beside:
 The wretch whose deeds all moral worth disgrace,
 Unblushing boasts a long illustrious race;
 Tells of his sires, when pers'nal virtues fail:
 Let such attend, and listen to my tale.

Two brethren we—if brethren be in name—
 Each by a different sire, and different dame:
 Knavery my first on impudence begot,
 My next on ignorance, by a moonstruck sot:
 Soon as matur'd, each plies the self-same task,
 And works his purpose in a different mask;
 At the same end their several labors strike,
 Though in their natures none are more unlike;
 Each follows close the ancestral line,
 And all the parents in the offspring shine.

My cunning first, with all his father's art,
Seeks to beguile the unsuspecting heart;
For gain he strives to make his doctrines pass,
And draws assistance from his mother's brass.
Not so my next; though he in turn assails,
And hopes your credence to his wond'rous tales;
What he asserts the simple wretch believes,
And is deceiv'd himself whilst he deceives.

The world at large is theirs, all ages, climes,
And will continue to the latest times;
'Midst Greenland's frost, in Afric's burning ray,
They stand confess'd, and thousands own their sway.
In our own land, in Britain's happy isles,
Where art tow'rs proudly, and where genius smiles,
Their baneful influence stretches wide and far,
The chair, the church, the senate, and the bar:
The wily statesman, vers'd in crooked ways,
For ever prompt to trumpet his own praise,
No selfish views impel his search of fame,
The public good his first, his only aim;
With caution hear, nor credit what he spoke,
My eldest hero peeps beneath his cloak.
The wrangling lawyer, with his ceaseless tongue,
Confounds distinctions, argues right is wrong,
Sense, law, and justice, twisted at his will,
State what he pleases, he's my elder still.
The learn'd physician near the patient's chair,
Demure his look, as wisdom's self was there;
The pulse he feels, adjusts his vast of wig,
Mystic his speech, no oracle so big:
Or in another guise, from stool or stage
He deals his dose to a believing age;
In either way they cheat your list'ning ears,
And my first brother plain enough appears.
The lazy cobbler, sick of soles to drub,
Mounts up soul thumper in his lofty tub;
With voice of thunder, and with lifted hand,
He deals damnation to a sinful land;
To his own clan he stands the saint confess'd,—
Trust me, he's but my second born, at best.

There is a third, as ancient story goes,
From which, as says report, the name arose;
But not in blood, or birth, at all allied,
Humble its parent, and devoid of pride;
Bred in the country, without wish to roam,
Nor child or parent travels far from home:

Small are its claims to merit your regard ;
 Heard, if not seen, within some farmer's yard.
 But whether 'tis in names some magic lies,
 I leave to be determin'd by the wise ;
 In ev'ry quarrel it will bear a part,
 And enter boldly to the very heart.

15th Enigma, by Mr. WALTER THOLOBY.

Assist, some friendly, favouring muse,
 Fit language for my theme to choose ;
 Else long and lonely I may pore
 In silence on a scanty store ;
 Nor suffer it to be my doom
 To rest in solitary gloom,
 Whilst others of a kindred name
 Are handed down to lasting fame.
 From eastern lands, their native place,
 The beauteous captives of our race
 Were from a fav'rite forest torn,
 And o'er the trackless ocean borne
 To Albion's shores (renowned land),
 Where Freedom claims her foremost stand.
 And, though 'tis circumscrib'd to me,
 I'm still comparatively free.
 There, in majestic, martial mien,
 In many a public place I'm seen.
 My warlike coat and pointed arms
 Might raise in timid minds alarms ;
 The gorgeous crown upon my head
 E'en fill the bold with cautious dread.
 My courage lions ne'er dispute,
 The glory of both man and brute ;
 For from my earliest days am I
 Still taught to conquer or to die.
 But from such bloody ideas turn,
 That widows make, and orphans mourn :
 Ah, why should innocence e'er feel
 The mard'ring power of pointed steel ?
 I back the preacher's powerful voice,
 And bid mankind rise and rejoice,
 For God hath given us both command
 To cry, "Behold his day at hand !"
 Then, reader, from thy slumbers wake,
 The friendly warning quickly take.

Apply thy hand to useful toil,
 To guide the pen, or turn the soil:
 Unto thy mind the task is given,
 To fix its nobler powers in heaven,
 Till freed by death, the last release,
 Thou from thy labours rest in peace.

16th Enigma, by Miss WINIFRED WAVEERTON.

My good friends, would you search the whole universe round,
 Such a changeling as I am would scarcely be found.
 But let me endeavour myself to explain:—
 I am incomprehensible, easy, and plain;
 I'm vindictive and cruel, yet merciful too;
 I'm black, white, and yellow, green, scarlet, and blue;
 I'm old and decrepid, young, hearty and strong,
 Gigantic, diminutive, square, and oblong.
 The sun in his glory may dazzle the eye,
 Yet though dismal and dreary, much brighter am I;
 Whatever is good, it must still be confess'd,
 Upon sober reflection, that I am the best;
 I am poor and magnificent, timid yet bold;
 So with all these extremes, pray my nature unfold.

17th Enigma, by Mr. THOMAS WHICKER, Exeter.

Ye who the dark, and mazy labyrinths
 Of occult themes delight to travel o'er;
 The veil'd enigma, or the charade trite;
 Attend my song—for no mean wight am I—
 Thy Maker, man, form'd me, and gave me pow'rs
 To glad the hills, and make the vallies smile,
 The barren waste to shoot the golden ear,
 The vine to spread her luscious grape, the thorn
 To blossom, and the fig-tree teem with fruit;
 Cool the dog-star's burning ray; give health to man;
 To feed the hungry, and the thirsty cheer;
 Comfort and support the weary pilgrim,
 And he who plods his way o'er desert wilds.
 Should heav'n forbid my active pow'rs, then woe,
 And wretchedness, and famine, would arise,
 As was in great Elijah's wondrous day;
 Not with a sword, but with extended bow
 At which the peasant with amazement looks.
 Behold yon hoary sage, on bended knees,
 Imploring heaven to bless mankind with me:

I come, and then rejoice the peopled nations,
 For with me Plenty comes, with overflowing horn.
 Though formed by the great Almighty's hand,
 I plodding mortals tease, who devices use
 Of curious art, lest I should them annoy;
 Untoward deem'd by some, and rough by others.
 In winter I am hard, in summer soft;
 And gentle as the falling dews, o'erspread
 The beauteous face of nature.
 On two great purposes I have been sent
 To kill, destroy, and desolate:
 Such was the irrevocable decree.
 And who shall contradict the high behest?
 Shall man presume? yet he will murmur
 At my great abundance, or when I'm scant;
 And will sometimes dare to call me partial.
 To all the holy fathers I was known,
 And had their blessings too. Then pray, vain man,
 Thy impious murmurs check; and if to-day
 I do not visit thee, I will anon.
 Thus, bards, my little history I've given,
 And told you that I can both kill and save.

18th Enigma, by Mr. NOAH WILMOT.

To assist you, dear gents, in your search after me,
 Descend, if you please, to the depths of the sea:
 If there I escape you, ascend then on high,
 For the learned have made my abode in the sky.
 But should I illude you, again just retrace
 Your steps to the earth, and continue the chase;
 Where I'm sure to be met with in one shape or other,
 Either lying alone, or hung up with a brother.
 Like felons we're treated, resistance being vain,—
 We dangle in air by a rope or a chain,
 Our lives are a burden, oppression our fate,
 Borne down to the earth by unmerciful weight:
 Our master relentless, we never can please,
 Till load upon load bring us down to our knees:
 But then, as if stung by the pangs of remorse,
 He's immediately anxious to alter his course,
 By easing our burden—but what does that do?
 No sooner releas'd than we're burden'd anew.
 Thus teas'd and tormented, reliev'd and oppress'd,
 As the ups and the downs in our lives will attest,
 We struggle and toil our employers to please,
 At the sacrifice often of comfort and ease.

But a truce to complaining. Consider our use,
We're justice and equity made to produce :
The banker consults us in ticklish affairs ;
The doctor without us sincerely declares
He cannot with safety his petious compound ;
We equally useful to bakers are found.
Yet like the best blessings bestow'd upon men,
Our use is perverted again and again ;
And in place of a guide to point out the right way,
We turn rank deceivers, and lead you astray.
But here we must finish our tedious tale,
And leave Entertainers to withdraw the veil.

19th Enigma, by Mr. JOHN YEWDALE.

I come, never waiting for an invitation,
I'm welcome whenever I take up my station,
Esteem'd by the king and the beggar ;
Though royalty by me hath suffer'd disgrace,
And noblemen sometimes I'm known to debase,
The poor I exalt, so chang'd is his case,
With me, though in need, he can swagger.

Though some I dishonour, I'm nothing amiss,
The fair sex most gladly will give me a kiss
And hail my approaches with pleasure ;
I'm prized by the hero who war often wages ;
Belov'd by philosophers, poets, and sages ;
And he who to worship his Maker engages,
Does publicly own me a treasure.

Yet though I'm acknowledg'd a thing of such worth,
My parents are murder'd, ere I receive birth,
Their blood constituting my essence ;
And whilst in embryo a violent commotion
Pervades all my members—like some who've a notion
That they than their neighbours more merit promotion,
And constantly shunning their presence.

This tumult, however, in time doth subside,
And then I come forth like a new married bride,
Fresh, blooming, vivacious, and pretty :
By man, cruel man, then I'm seiz'd and confin'd,
A pris'n'r to some foreign kingdom consign'd,
And there in a dungeon, by masters unkind,
I'm thrust, without feeling or pity.

Howe'er, in due season I'm brought forth to light,
 And thousands, ere now, have rejoic'd at the sight,
 For a beautiful tint I appear in ;
 Both the body and mind oft I invigorate,
 The first I recruit, and the last I elate,
 Add strength unto courage, and warmth to debate,
 The weary and sorrowful cheering.

20th, or PRIZE ENIGMA, by Mrs. C. C. RICHARDSON,
Vauxhall.

Lives there a being on this spacious earth
 So sunk beneath stern apathy's controul
 That scenes of sportive cheerfulness and mirth
 Wake no responsive feelings in his soul ?
 From him I turn, his chilling frown would quell
 The joyous impulse whence I gaily spring,
 For surely care and sorrow cannot dwell
 Where I, the child of gladness, join the ring.
 Some sweet domestic spot—perchance the green
 That fronts the rural cottage, or the bower,
 Where, graced with rosy health and blooming mien,
 The village children sport the happy hour.
 Should the grave husbandman, with thoughtful eye,
 Pass the gay throng, he owns with laugh sincere,
 I once was his delight in days gone by,
 Though, should he now pursue my wild career
 'Twere folly deem'd : he wisely turns away,
 And haply wanders o'er his ample fields,
 To view his thriving cattle or his hay,
 Or mark the growth his smiling tillage yields.
 His fav'rite colt with drooping head he spies ;
 Alarm'd, he calls—and waking in affright,
 Swift o'er the plain the bounding courser flies,
 While his glad master views me with delight.
 Return'd to dinner ; on the smoking board
 The farmer's wife a wholesome joint has placed ;
 And I, among the rest, my aid afford
 To add a relish to the homely feast.
 For from Italia's banks, or Gallia's plains,
 I come, prepared by culinary skill :—
 Associates, tell my name, and, for your pains,
 Cut me, or taste, as often as you will.

NEW CHARADES.

1st Charade, by Mr. J. BAINES.

'Tis raiment does my first complete,
When in a sitting posture ;
Ill-humour is my next, not meet
For any one to foster.

And should my whole be ever thought
But worthy your attention,
You'll find it (perhaps acific wrought)
A wonderful invention.

*2d Charade, by Mr. W. HARRISON, Ogle Barony,
Northumberland.*

An oxide you my first will find ;
My second skims the briny spray ;
My whole in thickets you will find,
When you pursue a devious way.

Transpose, my first you'll then detest,
And own my second has no end ;
Combina'd, I've many a lady drest ;
And am the mercer's constant friend.

3d Charade, by Mr. JOHN HERDSON.

Commotion you may call my first,
For it is never known to rest ;
My second blooms on yonder plain,
Where bees delicious sweets obtain ;
My whole's a Caledonian Town,
Of great resort and high renown.

4th Charade, by Mr. JOHN HOPE.

When Eden in beauty primeval was beaming,
Alluring the senses and charming the mind,
Afar from distress, and of ills never dreaming,
On pleasure's soft bosom my first lay reclin'd.
My next you may view where yon citadel, rising,
O'erlooks the rich pasture or dasied lawn,
A hard son of toil the inactive despising,
Still heaping up wealth till the season is gone.
My whole with the ladies may vie in attraction,
But hard and unfeeling its bosom is found ;
To some it may seem to give much satisfaction,
Whilst others it leads the wide ocean around.

5th Charade, by Mr. PERCI KING.

Leave for a while this busy world,
Nor through its bustling ways be hurl'd
With impulse strong :

Let 'magination take a flight
Beyond the reach of solar light,
The sprites among.

There view my first—ideal form !
But, lest the sight should do you harm,
Proceed with care :

My next the juggler makes with ease,
This way or that, as he may please,
Move through the air.

Conjoin the two—whence blows the wind ?
You'd better, Sir, just step behind,

Dust in me lies ;
And if some rude, unthinking wight
Should put the powder into flight,
'Twill close your eyes.

6th Charade, by Mr. W. LESTER.

What is my first? both I and you ;
My next always avoid to do ;
My whole's an insect, and 'tis plain,
When caught, behold a rogue in grain.

7th Charade, by Mr. R. MIDDLEMIST.

When harvest loads the smiling field
My first's the farmer's joy :
It can both pain and pleasure yield ;
Preserve, and yet destroy.

My second is a shrub of fame,
And to my whole allied ;
A precious oil too owns the name,
In days of yore the pride.

Search eastern climes, serene and warm,
My whole does there abound,
Couched in an humble, lowly form,
Yet breathing fragrance round.

But take me in a nobler view—
Religious sects agree,
That Jesus and his faithful few
Are oft compared to me.

8th Charade, by C. N.

A kind of ship you'll first pourtray,
And then a chief pray next display—
These two conjoin'd, in order due,
Will quickly bring my whole to view.

9th Charade, by Miss BETSY ROBERTS.

In pleasant vales and gentle gales
My first is quite refreshing;
My next so neat, with charms replete,
Is worth a swain's possessing.

My whole is found on broken ground,
Or on the raging ocean;
A friend indeed, in time of need,
When put in active motion.

10th Charade, by Mr. T. R. SMART,

My glittering first what language can explain,
It's hues camellion, changeful as the vane;
Permit it not, ye fair, your hearts to gain,—
Pleasure the promise, oft the payment pain;
List to the sage advice which wisdom tells,
And add my next, where filth proverbial dwells:
The union shall your innate worth declare,
And add new charms, though Venus not more fair.

11th Charade, by Mr. THOMAS WHICKER.

My first is good, yet very bad,
It is both sweet and sour;
It has a voice, yet it is mute,
And does invectives pour.

'Tis oft rewarded with my next,
At least it should be so;
And yet, its qualities are such,
Is a gift of merit too.

My whole is of a human shape,
But has a beastly heart;
Whene'er you hear my first, dear gents,
My second well impart.

NEW REBUSES.

1st Rebus, by Mr. J. BAINES.

A liquor revers'd, and a colour likewise,
 The vilest of crimes will unfold ;
 Beware then, ye wretched, integrity prize,
 Lest to do it ye're tempted by gold.

2d Rebus, by Mr. J. BATY.

An ancient bard, whose works the critics praise,
 What poets oft compose in various ways,
 What teaches man to fear the Power divine,
 And what will be where saints for ever shine—
 Th' initials join'd, a poet's name disclose,
 Who in the ENTERTAINER yearly shews
 That he can beauteous scenes of Nature gay,
 And glories of celestial realms, display.

3d Rebus, by Mr. W. HARRISON.

Transpose one of the feather'd race,
 Then in your frame I have my place ;
 Decapitate, and then you'll see
 That I am now a well known tree ;
 Curtail'd again, the ladies know
 That I to them am ne'er a foe ;
 Again, and then without a doubt,
 You'll find that I am never out.

4th Rebus, by Mr. J. HERDSON.

A brilliant star; the raging main ;
 What ev'ry christian should maintain ;
 And what's unknown in heaven ;
 Th' initials join'd will straight unfold
 What never should be bought or sold,
 But always freely given.

5th Rebus, by Mr. PERCI KING.

Those who go down unto the deep
 Ne'er find its guardian fast asleep ;
 But ever and anon in action,
 Tolling like some restless faction.
 Up to my whole the sea he blows,
 And multiplies the sailor's woes.
 Lop of my head, and change the ocean
 For water fresh, but still in motion :

Behead again, if skill'd in trade,
You'll find of different lengths I'm made ;
And, what may more create surprise,
I'm now conspicuous 'fore your eyes.

6th Rebus, by Mr. W. LESTER.

From foreign climes I'm brought to Britain's shores,
Shun'd by the wise, what many a fool adores ;
Behead it, and reverse what then remains,
A passion dire the placid man refrains ;
Behead again, and take a last review,—
I kill'd old Jenkins, and may yet kill you.

7th Rebus, by Mr. D. ROBERTS.

We are hid by our parents in verdant recesses,
Where luxury's son his mansion possesses ;
Our head then lop off, add another, see places,
Where we and our parents do often run races ;
Dismember the last of its tail, then 'tis found,
With good my lord bishop, attach'd to his gown ;
The last part restore, now cut off the first,
Transpose, and then, sportsman, kill me if you durst ;
For if you behead me when trembling with fear,
'Twill discover most clearly the aspect you wear.

8th Rebus, by Mr. D. T. SHERIDAN.

One half of what sways both the pulpit and bar,
The army, the navy, and other professions ;
The all-ruling bias in peace or in war,
And saves many knaves at assizes and sessions.
One half of a precious and beautiful stone,
That softly reflects all the hues of the season ;
And half of a metal, to poets well known,
Which the great goddess Dullness adopts with good reason.
An article duly prefix'd to these parts,
Behold the grand theme and true essence of glory !
The author of commerce, of science and arts,
And forms the bright gem of poetical story.

9th Rebus, by Mr. T. R. SMART.

A preposition my first word,
My next a point of time ;
A gay amusement is my third,
In ev'ry age and clime.

As monosyllables the train
 Direct command convey,
 My second gives the period when
 My third shall come in play.
 When polysyllabic, your fate
 Is grating to the soul,
 If, on the little or the great
 My third you act my whole.

10th Rebus, by Mr. J. YEWDALE.

I'm thought a disgrace if seen on your face,
 The fete of some broil I discover ;
 But take off my head, I'm then in the shed,
 Where cattle are feeding on clover.
 Behead me once more, I paint out the hour,
 And bid Mr. Hammer to strike it ;
 Though twice, as you've seen, beheaded I've been,
 You may do it again if you like it.
 Transpose what remains, you'll have for your pains,
 What always is found where there's talking ;
 Decapitate this, I'm part of your dress,
 Adorning your person when walking.

NEW ANAGRAMS.

1st Anagram, by Mr. J. BAINES.

My whole's an easy pace, 'tis true,
 In which your paltry goes ;
 The order chang'd, will bring to view
 What augmentates your woes.
 Curtail it, and again transpose—
 How meek its native powers !
 Fit emblem of that soft repose
 In Paradise's bowers.

2d Anagram, by Mr. J. BATY.

The head of a nail in due form take away,
 And a figue well known it will quickly display ;
 The figure behead, and it soon will unfold
 The state of some land which you often behold ;
 From the state of the land the two first if you take,
 What strength oft denotes, then it quickly will make ;
 This sign of some strength, if aright you transpose,
 The name of a man it will quickly disclose.

3d Anagram, by Mr. J. HORE.

"Midst the verdant, leafy grove,"
See my first, its wings extending;
View me, as abroad you rove,
Many a fertile field defending.

Change me; now you me dispute—
Tell me, why this hesitation?
Would you openly confute,
Or discredit my narration?

Change again, a slave I'm found,
Subject to my master's pleasure;
With the Spaniards I abounded,
There I am esteem'd a treasure.

But beware,—if chang'd again,
See the angry boar is grinning;
Yonder lion shakes his mane—
Danger shun in the beginning.

4th Anagram, by Mr. W. LESTER.

Associates, listen to me,
Amusement's the end of the story;
Transpose me, in feathers you'll see
A something that's not whig or tory.

Transpose me again,—it strikes one;
Depend on't its me, so good night;
Let's take up our hats and be gone,
Whilst yet a fair moon's shining bright.

5th Anagram, by Mr. D. ROBARTS.

To the groves we add beauty, and shelter, and shade;
We also are useful to commerce and trade;
Change us, then a part of yourself you will find,
Which Nature most aptly has placed behind;
One more transformation a fowl will produce,
For which the keen sportsmen oft makes an excuse.
Now cut off the tail of this delicate bird,
In its place you will find a contemptuous word
Applied to a man. Curtail it once more,
It is felt by the trees on the northern shore;
Which if you reverse, and are greedy of gain,
I'll engage you shall have the produce for your pain.

6th Anagram, by Mr. T. R. SMART.

Divide a piece of beef or pork,
 Without the aid of knife or fork,
 It gives a place, rejoin'd with skill,
 Where you may put it, if you will.
 Strike off my first, the hinder place,
 'Tis plain as nose upon your face ;
 Slit down the midst as now you find,
 And what is first you place behind ;
 Smaller than ever, you discover,
 And in a measure all is over.

QUERIES AND PHILOSOPHICAL QUESTIONS.**1st.—By Mr. J. BAINES.**

If the petals of Scilla-nutans (English Blue-bells) be held in the flame of a candle or culinary fire for a little time, they will be changed to a white colour. Required the reason of this ?

2d.—By ENIGMATICUS.

Mr. Chevenix has pointed out a curious anomaly in the amalgamation of platina. The specific gravity of the amalgam he states at only 11.5, whereas the specific gravity of the metals from which it is formed are not less than 13.5. No one has hitherto given any satisfactory explanation of this curious circumstance.

3d.—By Mr. W. HARRISON.

Whether are mental or corporeal accomplishments more likely to captivate the affections of man ?

4th.—By Mr. J. HERDSON.

How are we to understand the Psalmist when he says, "I am become like a bottle in the smoke."—*Psalm cxix*, 88.

5th.—By Mr. T. HOGAN.

Prove that, in a strict mathematical sense, the weight of a body at midnight should be less than its weight at noon.

6th.—By Mr. J. HOPS.

How can this verse of the LX Psalm be explained ? "Moab is my washpot ; over Edom I will cast out my shoe ; Philistia, triumph thou because of me."

7th.—By Mr. PERCI KING.

Required the derivation and literal meaning of the name *Thomas*.

8th.—By Mr. D. T. SHERIDAN,

Is a perfectly free trade the mutual interest of all nations.

THE

ENIGMATICAL ENTERTAINER.

LAST YEAR'S ENIGMAS.

1. Feather	6. Nothing	11. Name	16. Adjective
2. Debt	7. Tail	12. Shoe	17. Rain
3. Grave	8. Cross	13. Surface	18. Scales
4. Discourse	9. Hunger	14. Quack	19. Port wine
5. Garden	10. Match	15. A cock	20. Caper (<i>Prize</i>).

ANSWERS TO THE PRIZE ENIGMA.

1. *By Mr. JOHN HOPE, Hethersgill.*

Should I attempt to name the prize,
 And place the same before your eyes,
 I might perhaps be call'd a glutton;
 For sure the epicure is glad
 When many dainties he has had,
 And *capers* to a leg of mutton.

2. *By Mr. THOMAS WHICKER, Exeter.*

Fortune! on thee no more I'll frown,
 Thou'st cut a happy *caper*;
 Thy brow I will with chaplets crown,
 And drive each gloomy vapour.
 False hag—again I will not call thee,
 Nor deem thy favours fickle;
 Long in this page well pleas'd extol thee,
 In strains shall cope with Tickell.

Like Winny*, don't the profit heed,
 But prize, like she, the honour;
 If e'er towards her cot I speed,
 I'll surely wait upon her.

It was likewise answered by Messrs. John Baines, C. N., J. H. Parsons, James Powell, John Richardson, Lovell Squire, Henry Smith, William Temple, John Yendall, and Frederick Yarrow.

GENERAL ANSWERS TO THE ENIGMAS.

1. *The Rose: from the Greek of Anacreon.* By Mr. J. BAINES,
 Thornhill Grammar School, near Wakefield.

Come, my friends, in rural strains,	17
Let us celebrate the rose,	s, 8
While it decorates our plains,	
And the soothing zephyr blows.	6
How it scents the tepid air!—	
Men their joys by it refine;	
Rosy braids, the Graces fair	
In their flowing tresses twine.	19
Playfulness, the rose beneath,	er, 1
Venus' charms are there display'd;	18
Then how sweet it is to breathe	
In a rose-embowered shade.	
How delightful 'tis to stray,	
And from thorns to cull the rose;	10
Grateful is the rosied way	12
To the heart, and hands, and nose.	
Mirthful raptures are enhanc'd	quack, 14
By a rosy festoon'd room:	
Bacchanals have often danc'd,	k, 15
Garnish'd with the rose's bloom.	n, 5
Rosy-fingered is the dawn;	
Brides we rosy-armed name;	11
Her whose car by swans is drawn,	
Is the rosy-cutid dame.	
Fell diseases oft have fled	
By the virtues of the rose;	
Rosy perfumes scent the dead	
In their final, last repose.	

* Miss Winifred Waverton.

When the foam of the great main
 Aphrodite brought to view,
 And when Pallas, from the brain
 Of the thund'rer, armed flew ;
 Great Olympus then beheld 9
 Earth produce this lovely flower ;
 All the gods, with rapture fill'd, 7
 Hail'd its fascinating power. 20
 And with care its stem they rear'd,
 Pouring nectar on the ground,
 Till the opening flowers appear'd,
 Breathing fragrance all around.

2. *An Elegy on the Death of my beloved Wife, who died
 July 27, 1829 : by Mr. JOHN HOPE.*

"Ipse cavâ solans ægrum testudine amorem,
 Te, dulcis conjux, te solo in litore secum,
 Te veniente die, te decedente canebat." Vir.

Most plaintive of the ever tuneful Nine,
 Melpomene, from Helicon descend ;
 Pour softest melody in ev'ry line,
 And soothing sadness with my numbers blend.
 For oh ! my energies by grief depress'd,
 Ill fitted now to wake the tuneful lyre,
 I'm taught to feel for human kind distress'd,
 And all the ardency of fond desire.
 In former years the tide of pleasure swell'd,
 The course of life was one unclouded morn ;
 By fate's oppressive tempests unrepell'd,
 My bark on gently flowing seas was borne.
 And sure, if happiness is found below
 Yon azure vault where holy seraphs dwell,
 'Twas mine on earth the goddess fair to know,
 And in succession all her charms to tell.
 Then was I blest—blest with a friend sincere,
 Most cheering child of Nature's varied birth ;
 Possess'd of all that womankind endear,
 And render life a paradise on earth.
 With her I hail'd the flow'ry bloom of spring,
 Hung o'er the bosom of the summer's rose ;
 Enjoy'd the sweets returning autumns bring,
 And gather'd comfort from hibernal snows.

The *garden* gay in brighter hues appear'd ;
 In notes more charming sung the *feather'd* train ;
 "The *cock's* shrill clarion" early morning cheer'd,
 When dewy drops begemm'd the verdant plain.

With soft *discourse* the rapid moments fled,
 Borne on cherubic pinions ever bright,
 Till glowing Hesperus his legions led,
 And clos'd around the dusky shades of night.

For her I toil'd, yet all my toils were joy,
 Spurr'd on by consciousness of being lov'd ;
 An honest *name* unstain'd by base employ,
 By her and me was still alike approv'd.

A friend to goodness, but to vice a foe,
 She priz'd religion as her surest guide ;
 We all offend as through this world we go,
 "But ev'n her *sailings* lean'd to virtue's side."

Kind to the sick—the poor man's lonely cot
 To ease the pangs of want and pain she sought ;
 She freely gave, though circumscrib'd her lot,
 And prompt assistance to the needy brought.

But short her life—alas ! her morning sun
 Soon wan'd in lustre—hasten'd in decline :
 Scarce six short years their circling course had run—
 How brief the period that I call'd her mine !

And now 'tis o'er !—she's left this earthly ball,
 To rest, I trust, in far more happy climes,
 No more to feel the ills which here enthrall—
 Pains, *crosses*, troubles, and oppressive times !

Yet still I live, with troubles to contend,
 A cheerless pilgrim in this vale of care,
 No offspring left my sorrows to befriend,
 "Or climb my knees, the envied kiss to share."

In such a state, where shall I find relief ?
 Oh ! whither turn my aching head to rest ?
 When shall I lay aside this load of grief,
 And be as when with her so highly blest ?

• Ah ! day by day fond recollection glides
 O'er scenes I formerly with *pleasure* traced ;
 And in my lonely *breast* her form abides
 Engraven deeply, ne'er to be effac'd.

Pr.

The fields in Flora's richest pride may bloom ;
 Pomona's choicest stores adorn the trees ;
 But sunk my fondest hopes in yonder tomb—
 The most enchanting scenes have ceas'd to please.

O sons of genius, all beneath the moon
 The sport of fickle, wayward Fortune seems ;
 Blest with her smiles, we dream at brightest noon ;
 But ah ! how "fatal" oft "our waking dreams !"

Be timely wise—your hours are fleeting fast—
 They quickly pass, not to come back again ;
 The present seize, no more you have the past—
 Nor once of brevity of life complain.

Behold the fig-tree putteth forth its leaves—
 The summer dawns, next autumn comes apace ;
 Then follows winter, when all nature grieves :—
 Then think on human life, when these you trace.

* * 16 *Adjective.*

3. *An Address to Correspondents: by C. N., of Creeg Barkley Burrow, Kenwyn, Cornwall.*

Let *port wine* and *capers* the ingenious unravel,
 Though over the *surface* they *shoeless* may travel ;
 If *debts* they contract, they may *hunger* endure,
 Although on their lands the *entail* may be sure.
 Should *cockade*, or *feather*, or such empty gear,
 Make *quack'ry* like rain in abundance appear ;
 Yet all earth-born sons, let them think what they may,
 Will rot in the *grave* "as sure as the day :"
 Then what folly and madness to live as most do,
 I'd hope better things, fam'd Associates, from you.

Let the *scales* of the scriptures your ev'ry act weigh,
 See that *nothing* retard or hinder the way ;
 To the *cross* of the Saviour, O, instantly fly,
 If you're not prepared to meet him on high :
 O that *matchless name* "sounds sweet to the ear"
 Of those who for mercy are seeking sincere ;
 His *discourse* on the Mount practise and embrace,
 Assur'd 'twill afford you his justifying grace ;
 Should you doubt of his goodness, then think on the plan
 In Gethsemane's *garden* he suffer'd for man !

* * 16 *Adjective.*

4. *Puffs in Trade: by Mr. J. YEWDALE, Hunstlet, near Leeds.*

What puffs are made by <i>quacks</i> in trade,	17, 14
To make poor buyers wonder ;	
As by wholesale they can <i>retail</i> ,	7
Yes, at prime cost, and under.	8

Their sales to force with grave discourac, 18, 3, 4
 Such goods no one can match 'em; 12, 10
 Nor such can get, he broke in debt 2
 From whom they chanc'd to catch 'em. inc, 9

Some print their name, and past the same, 19
 With fine leaf gold on paper; 15
 Your ears they'll shock, "'tis bankrupt stock 1, & prize
 Once own'd by Feather Draper."

Dear gents, beware, such knaves there are, 5
 Guard well 'gainst imposition;
 The value try before you buy,
 And make a just decision.

* * 6 Nothing. 16 Adjective.

Answers were also received from Messrs. James Bean, Hogan, Kniveton, Oakes, Powell, Parsons, Richardson, Smith, Whicker, William Williams, James Wright, and Yarrow.

ANSWERS TO THE CHARADES.

- | | | |
|--------------|--------------|---------------|
| 1. Lappet | 5. Puckball | 9. Windlass |
| 2. Rust-ling | 6. Weevil | 10. Modesty |
| 3. Stir-ling | 7. Spikenard | 11. Saucebox. |
| 4. Adamant | 8. Cathead | |

By Mr. JOHN BAINES.

Compare the sexes, and you'll find 8
 Nature unerring, just and kind, ling, 2
 Has made them diff'rent quite;
 The softer sex is meant to please,
 Has more of elegance and ease,
 To raise and give delight :—
 A fairer form, a finer mien,
 A heart more gentle and serene,
 And less assail'd by care.
 Their smile is sunshine—in their face
 Sits meekness on a throne of grace,
 Majestically fair;

While accents melted from their tongues	
Surpass the harmony of songs,	
In cadence and in sound ;	<i>mant</i> , 4
And ev'ry glance that leaves their eyes	
Is sweeter far than vernal skies,	6
When Flora's train abound.	<i>spikenard</i> , 7
The rose fresh gather'd from the bush	
(Meet emblem of a female's blush,	<i>puff-ball</i> , 5
By modesty suffus'd,)	10
Sits graceful on their fine dark hair,	
Wove in a wreath supremely fair,	
In ringlets loose diffus'd.	3
Such forms will cause the heart to own	<i>box</i> , 11
A set of instincts quite unknown	
To worldling's base employ,	<i>pet</i> , 1
To glow with momentary fires,	
And melt with soft but chaste desires,	9
And feel the thrill of joy.	

The Charades were also answered by Messrs. Bean, Harrison, Kniveton, Oakes, Parsons, Powell, Richardson, Smith, Yewdall, and Yarrow.

ANSWERS TO THE REBUSES.

- | | |
|--------------------------------|-----------------------------------|
| 1. Murder | 7. Fawns, lawns, lawn, swan, |
| 2. Hope | wan |
| 3. Snipe, spine, pine, pin, in | 8. People |
| 4. Vote | 9. Attendance |
| 5. Swell, well, ell | 10. Scratch, cratch, ratch, chat, |
| 6. Segar, rage, age | hat. |

The Lover's Vow: by Mr. JOHN BAINES.

Think not that e'er my heart can change,	
That I'll inconstant be, love ;	
Tho' others like the breeze may range,	
I'll ne'er prove false to thee, love.	2
No, while the summer's sun is bright,	
And night the day shall flee, love ;	
Nay, while the winter's snow is white,	
I'll ne'er prove false to thee, love.	4

Forsake thee !—no, the rose's blush	
Shall quit <i>its</i> parent tree, love ;	3
The grape produc'd on ev'ry bush,	
Ere I prove false to thee, love:	was, 7
The <i>radiant</i> stars in heaven's expanse	c, 9
All darken'd orbs shall be, love,	
And yield no more one cheering glance,	
Ere I prove false to thee, love.	
The magic of thy azure eyes	der, 1
Is truly felt by me, love,	
And by <i>their</i> softness, which I prize,	c, 10
I'll ne'er prove false to thee, love.	
The darksome night shall all things sway,	6
Its reign eternal be, love,	
This earth itself shall waste away,	5
Ere I prove false to thee, love.	

Answers were also sent by Messrs. Bean, Harrison, Kniveton, Oakes, Parsons, Richardson, and Yendall.

ANSWERS TO THE ANAGRAMS.

- | | |
|---------------------------------------|---|
| 1. Amble, blame, lamb | 4. Tale, teal, late |
| 2. Sparable, parable, arable,
able | 5. Pines, spine, snipe, snip,
nip, pin |
| 3. Rail, liar, rial, lair | 6. Chine, niche, chin, inch. |

1. *To Simplicity*: by Mr. JOHN BAINES.

Nymph of the woodland, the dingle, and dell,	4
Nymph of the forest and wild,	
Offspring of beauty, as chronicles tell,	3
And Nature's own favourite child :	
With thee let me wander, and only with thee,	
Where ripples the stream in its way,	
And list to the music, from every tree,	
Of songsters that usher the day.	
Come, then, <i>in</i> thy vestal adornments array'd,	6
With thy garland of ling-flowers crompt,	
And let me accompany thee, gentle maid,	
Up the steep of a mountain abrupt.	

Unenvying, say, what has wealth to allure,
 Or titles, or splendour, or show !
 Since happiness dwells with the peasant obscure, 2
 And care never wrinkles his brow.
 Thou, nymph, in the city that seldom art found, 5
 By luxury's votaries despis'd,
 But where humble worth and contentment abound 1
 Thy artless endearments are priz'd.

2. *Address to the River Tweed: by Mr. W. HARRISON,
 Long Framlington, Northumberland.*

Hail, native stream ! where often I have stray'd
 Upon thy banks, as evening clos'd around,
 To view wild Nature in her charms, array'd
 With purple heathbells, and wild heather crown'd !
 Ye rocky cliffs ! wash'd by Reed's rippling tide,
 Where oft in evening I was wont to stray,
 Bright Fancy's eye has oft to me descried
 Your rugged forms, when far from you away.
 How sweet to stand upon the purple fell, 4
 When evening's shades fall round each towering hill,
 And straight descending view the lowly dell,
 The hazel thicket and the winding rill !
 But, ah ! remote from yon romantic glen, 1
 Where oft at midnight owls their moans repeat,
 And where, remote from all the "hum of men,"
 I lov'd to take my solitary seat.
 Dame Fortune dooms my steps to turn away
 To glens, remote from this my fav'rite scene ;
 Where oft in childhood, at the close of day,
 I wander'd up the lonely valley green.
 For destiny, relentless, bids me move
 Far from thy scenery, where dwells content ;
 Far from the beauties of thy winding grove,
 In guileless pleasures, where my youth was spent.
 Still, Reed ! when summer's beauties deck the hills, 3
 And fragrant odours scent the roving air,
 I think upon thy lone sequestered rills,
 And youthful pleasures I experienced there. 5
 When Autumn, waving o'er the harvest fields,
 Displays the happy farmers' plenteous store,
 I think on joys thy lonely valley yields,
 And sigh that I partake them there no more.

And when the winds of Winter thro' thy woods
 Sublimely howl, and sweep along thy shore ;
 When thy proud stream is seen in raging floods,
 And vegetation smiles around no more ;

Still, still, sweet stream ! will Fancy truly shew
 Thy valley, and transport me back to thee ;
 To scenes which faithful memory will know,
 Till retrospection cease t' exist in me.

6

And when succeeding years shall stamp this frame
 With symptoms of a premature decay,
 I'll hope to roam the banks of Reed again,
 And *there* to mingle with primeval clay !

3. *The Partridge Shooters: by Mr. THOMAS WHICKER.*

September first had *ambled* on,
 And brightly now began to dawn ;
 The lark his lay " at Heaven's gate sung,"
 The weather promis'd fair,
 When started for the sport sublime
 A limb of Law, and son of Rhyme,
 O'er *arable*, in *presto* time,
 To have of birds a share.

1

2

But oft deceiv'd by *snipe* and *teal*,
 And eke by the sly noisy *rail*,
 They doubted if their sport should fail,
 And bear back empty bags ;
 They'd travers'd hill, cross'd bog and glen,
 And sweated like two aldermen,
 When dining off a fusty hen,
 Toothless as Macbeth's hags.

5, 4
3

But when the long-wish'd partridge rose,
 As close to them as *chin* to nose,
 Who could the hapless thing suppose,
 Each miss'd his powder-horn ;
 What could be done in such a matter ?
 No use to cavil, nor to chatter,
 Nor fleeting bird with stones to batter,
 Nor Tray to beat or scorn.

6

Home was the word, and home they came ;
 For, to conceal the hap and shame,
 They on their way met peasant Sam,
 And bought of him a couple ;

But, lo ! an urchin with lynx eye
 The crafty purchase did espy,
 And long before them home did hie,
 And made the people chuckle.

They were also answered by Messrs. Bean, Kniveton, Oakes, Parsons, Richardson, and Yewdall.

GENERAL ANSWERS TO THE ENIGMAS, CHARADES, REBUSES, AND ANAGRAMS.

Steaming: by Mr. NOAH WILMOT, S——s, near Newcastle on Tyne.

- The poets of old sung the ages of gold;
 Of silver, of iron, and brass;
 But the modern theme is high pressure steam,
 And lighting the world up with gas.
- The work of the flail as *well* as the sail, R 5
 Including our weaving and spinning,
 Is all done by steam, and the mail, it would seem,
 To run by it now's just beginning.
- We expect to keep pace with the *feathery* race, E 1
Match the snipe or the gull on the stream; E 10, R 3
 And over the lawns outstrip the young *fawns*, R 7
 On our high-mettled courser call'd steam.
- To where *spikenards* bloom—the Gospel's perfume— C 7
 A journey will be but a jaunt;
 For, *clap* on your steam, and how *petty* will seem C 1
 The *distance* to travel you want. rsc, E 4
- Let Wellington's Duke dismiss every rook
 That sticks to the state for its *peff*: R 8
 His machinery so plan, that his orderly Dan
 May manage the system himself.
- We've been by balloon near the verge of the moon,
 Our lamps without oil or wick gleam;
 And our ills will fly hence when to work we commence
 The national *windlass* by steam. C 9
- One ambassador then, with an *adamant* pen, C 4
 When *rail*-roads the continent cover, A 3
 Will do all our work with Christian and Turk,
 With high pressure steam for his mover.

- The *quacks* of the state that *caper* and prate, E 14, & 20
 And *vote* as the minister chuses, R 4
 Like *weevils* in *grain*, of our substance the bane, C 6, E 17
 May then be swept out of both Houses.
- As members of wood will just be as good,
 And give a far better *attendance* ; R 9
 Nor will the disgrace of *scrambles* for place A 1
 Interfere with such chaps' independence.
- Our brave British tars, in all future wars,
 On prize-money no longer dreaming,
Unscratch'd will be kept, yet the ocean be swept R 10
 By this wonderful process of steaming.
- Our warriors too, when Monsieur wooden *shoe* E 12
 A turn-up with Johnny is scheming,
 May at home tell their *tale* over *cigars* and ale, A 4, R 6
 As we'll then do his business by steaming.
- Instead of our sons, we'll send Perkins' guns
 To pepper the rogues to perfection :
 Whilst our steamers at sea will effectually be
 Our "Tight little Island's" protection.
- Our home affairs, too, must be modell'd anew,
 And the *scales* of Dame Justice adjusted, E 18
 As well as her beam, which Barking folks seem
 To think has got seriously rusted.
- The Chancery Court, where *nothing* is short, E 6
 And briefs oft run up to a ream,
 With every wig, both little and big,
 Are sentenc'd to act all by steam.
- What a beautiful sight of *nameless* delight E 11
 The *figures* will magical seem ; E 13
 To see the whole bar, without *rustling* or jar, C 2
Tails and all, *gravely* going by steam. E 7 & 3
- Then the poor *hopeless* heir, in want of despair, R 2, E 9
 Need not to self-*murder* be driven ; R 1
 By ball or by blade, and in *cross* roads be laid, E 8
 An outcast from both dead and living.
- As expense and delay will no more dismay,
 No *sauce-box* can mar such a scheme ; C 11
 For, should business press, we've the steam-cock-redress, E 15
 An additional pressure of steam.
- Their endless proceedings and heart-breaking readings.
 Their *sparring*, too, over the *table*, A 2
 Are all *fe-fa-fum*, which the ages to come
 Will treat as a tissue of fable ;

- Will all disappear, and the jobs in arrear
 With *modesty* soon be decided; C 10
 And the suitors all share, that fortunate are,
 The *sterling* lock'd up undivided. C 3
- Other parts of the state we'll too renovate,
 And corruptions like *puckballs* destroy; C 5
 So that every degree an equality
 Of right may hereafter enjoy.
- We coin at the Mint—we newspapers print—
 And *BABBAGE*, they say, has a scheme
 For working equations, abstruse calculations,
 And logarithms making by steam.
- We rear *garden pines* and grapes for our wines, E 5, A 5, E 19
 With strawberries too for our cream;
 Nay, we oft cook the *chine* off which we're to dine A 6
 By the application of steam.
- Thus, by steam we can do things ne'er dreamt of till now,
 Nay, we'll by it our *debt* soon redeem; E 2
 So monstrously great and oppressive the weight,
 That nothing can save us but steam.

ANSWERS TO THE QUERIES.

1st Query, answered by Mr. JOHN BAINES.

That the variety of the hues of flowers is owing to the influence of the solar beams, is obvious to common observation; for not only the flowers, but the foliage also, when growing in the dark, are white. The petals of *scilla nutans*, which are white before they are protruded from the calyx, have their surfaces afterwards encrusted with very minute flakes, which reflect the weaker rays of light, and absorb the stronger in their pores. Hence, by exposure to flame, the interstices of the flakes are altered, a greater portion of rays reflected, and the surface appears white.

Also answered by Mr. Harrison, and Mr. J. Mason, of Bristol.

2d Query, answered by Mr. JOHN BAINES.

It is a known fact, that most metals will mix in all proportions with each other, though, in some instances, not uniformly; but that the specific gravity of the compound is scarcely ever such as would be determined by mathematical calculation, supposing them united by contact only. Now, the attraction manifested in the union of metals by fusion, or by any other chemical operation, does not depend on the density of the particles made use of, but the specific gravity of the compound depends on the density of its

particles, and the proportion between their aggregate bulk and the bulk of the space occupied by the pores. This being the case, it is sufficiently obvious that the specific gravity of the amalgam is lessened by a diminution of the attractive force, and that its pores are larger than those of the simple metals.

Mr. PERCI KING says

This query is taken verbatim from Parkes' Chemical Catechism, which Mr. Enigmaticus should have *acknowledged*.

Also answered by Messrs. Harrison and Mason.

8d Query, *answered by Mr. JOHN BAINES.*

Savage nations, and mankind in general, in a state of nature, set the greatest value on corporeal accomplishments. When Saul was saluted king, it was remarked as one, not the least, of his qualifications, that he excelled all the people in stature from the shoulders upward, and that there were none like him. It is also not a little remarkable, that the word which we translate *virtue*, meant originally, among the early Greeks, military prowess; but when it was found out, by experience, that warlike achievements succeeded both from the strength of the body and ability of the mind, and that a judicious head was most serviceable, respect began to be paid to mental acquirements, and now they are preferred, by all civilized nations, to bodily feats.

Again, by Mr. J. HOPE.

Taking mankind in general, I believe corporeal accomplishments have much more power to captivate their affections than the mental. The unlearned (I speak comparatively) and the inconsiderate, who compose the great bulk of mankind, are led away and charmed, as it were, by outward appearances. The learned, however, and considerate, generally speaking, pay more regard to the accomplishments of the mind, and are consequently more frequently captivated by them.

Again, by Mr. PERCI KING.

Corporeal accomplishments are more likely at first to captivate our affections, but mental ones only can hold them in captivity. Bodily accomplishments, however agreeable, soon become familiar to the beholder, and then lose their power of captivating; but intellectual ones are continually appearing in some new and more favourable light; and, instead of becoming less attracting, like the others, as the possessor of them advances in years, these will, to the last, gain ground on the love and esteem of every person of sound sense and just discernment.

Answered by Messrs. W. Harrison, J. Mason, and J. H. Newton.

4th Query, answered by Mr. PERCI KING.

Bottles in Eastern countries are made of *skins*—commonly skins of goats, stripped from the animals without cutting them up. A bottle of this kind, hung up in the smoke, would soon become shrivelled and useless. The Psalmist seems to have been suffering under some great mental anguish, which wasted his flesh, dried up his spirits, and made him compare himself to a bottle in the smoke. But if this Psalm be considered as belonging to the times of the Babylonish captivity, the Psalmist must be considered as speaking in the persons of all the captives in Babylon. —See Dr. Adam Clarke's notes.

Similarly answered by Messrs. Baines, Harrison, Hope, Mason, Newton, and Temple.

5th Query, answered by Mr. J. BAINES.

The density of the atmosphere is greater at midnight than at noon, on account of the sun's rays rarifying the air; but a body weighed in a denser medium, weighs less than when it is weighed in a rarer; consequently a body weighs less at midnight than at noon.

Again, by Mr. W. HARRISON.

The density of the atmosphere at noon is evidently less than it is at midnight, on account of its rarefaction by the influence of the sun: but when the heat of that luminary is withdrawn, the density of the air becomes greater, the pressure on the under side of the board on which the body is placed is *increased*, and consequently the weight of the body is *less* than it is at noon.

Answered also by Mr. J. Mason.

6th Query, answered by Mr. PERCI KING.

Dr. Adam Clarke gives the following quotation as a correct paraphrase on the seventh and eighth verses of this Psalm:—“Gilead and Manasseh have submitted unto me, Ephraim furnishes me with valiant men, and Judah with men of prudence and wisdom. I will reduce the Moabites to servitude, I will triumph over the Edomites, and make them my slaves; and the Philistines shall add to my triumph.”

There are many difficulties in this Psalm. Some learned men have supposed that the three first verses of it are not in their proper place, but should be made to change places with the first three verses of the lxxxvth Psalm.

Messrs. Baines, Harrison, Mason, and Newton, also answered this Query.

7th Query, answered by Mr. J. BAINES.

The Christian name Thomas is a Hebrew word, and signifies a twin. In St. John's Gospel this name occurs three times with the epithet Didymus attached to it, which is the Greek word signifying the same thing.

Again, by the Rev. W. ROBERTSON, Blyth.

The name *Thomas* is derived from the Hebrew *Thaom*, to double or couple, translated in the plural *twins*, Gen. xxv, 24, and xxxviii, 27. *Didymus*, or the *twin*, is a literal translation of the Hebrew into Greek, John xi, 16. Hence we may conclude that the first person called *Thomas* received his name from the circumstance of his being a *twin*.

Also answered by Messrs. Harrison, Mason, Newton, and Temple.

8th Query, answered by Mr. J. BAINES.

If there were a free intercourse between all nations, the price of commodities could only fluctuate from natural causes: gain or loss would be equally the portion of the trading communities in different countries, and that nation only would have the advantage which might happen to have a superfluity of those articles that others were deficient in. But from the pretty nearly equitable distribution of the productions of nature, the exchange of commodities is mutual, and the gain upon traffic reciprocally balanced, so that one nation cannot suffer loss by restriction, unless another gain. From these considerations, it appears that a free trade is not greatly beneficial to all nations.

Again, by Mr. W. HARRISON.

It is probable, that free trade would ~~not~~ be favourable to the interests of *this* country, labouring as it does at present under debt, taxation, and other national grievances. But if we extend our view to every nation on the face of the globe, I cannot help thinking it reasonable for every man to take his commodities to the most lucrative market he can find. Some recent writers have argued, that the proper principle of society is not competition, as has been generally supposed, but co-operation; and that mankind would be more happy by mutual support than mutual opposition. It is probable that this will turn out correct. The history of the world has, for the last few years, shewn a strong tendency to a total change. Reciprocity has begun to be understood; and I should hope it will soon appear that to aid and support each other is a better course than for one nation to get out of the well on the horns of the other, as the fox in the fable did by means of the goat.

Likewise answered by Mr. Perci King, and Mr. J. Mason.

